Introduction to Science Test

The Science Test consists of 40 questions that you will have 35 minutes to answer. There will be 6 passages, each followed by 5 to 7 questions. **While it is called the Science Test, this section requires very little actual science knowledge. A more accurate name for this test would be "The Analyzing Charts and Graphs on Random Topics Quickly Test**," as the focus is on quickly analyzing charts and graphs.

To do well on the Science Test, you do not need to be good a science class. If you love science class, it can certainly help you, but it is far from a requirement to get a good score. For those of you who do not love science class, do not worry. You can still get a great score on the Science Test with practice.

What is on each ACT Science Test?

The ACT Science Test always consists of:

- **5 Charts and Graphs passages** test your ability to read charts and graphs and interpret information given in tables, diagrams, and figures. For certain passages, you will also be asked question about the experimental design. This is the most common type of passage on the ACT.

- **1 Conflicting viewpoints** passage that asks you to understand, analyze, and compare different hypotheses, opinions, or conclusions. This passage has much more text and sometimes has no charts or graphs at all. The heading in the passage say "Student 1, Student 2" or "Scientist 1, Scientist 2," so the conflicting viewpoint passages are easy to spot.

Within the passages, you will see six types of questions.

- **Detail:** These questions will ask you to locate a specific piece of data. To find the data point, look directly at the graphs, charts, tables, or diagrams. On more difficult inference questions, you may need to use multiple charts, graphs, tables, or figures at once you find the correct answer. Be sure to pay attention to the axes to make sure you are finding the right detail.

- **Pattern:** These questions ask you to spot a trend on a graph, table, or chart (increase, decreasing, etc.) or to use the pattern to identify where a data point would be.

- **Inference:** These questions will ask you to make a conclusion based on the data provided. Most commonly, you will need to use the data provided to draw a conclusion about a data point or situation that is not directly shown in the charts and graphs.

- **Method:** These questions test your understanding of experimental setup and scientific methods and ask you to "think like a scientist." You may need to think about how to gather data, how to setup a control, or how experiments can be improved.

- **Scientific Knowledge:** These questions require you to use some outside scientific knowledge. The outside science knowledge most commonly comes from biology, chemistry, or physics and is usually general knowledge students who have completes those classes are familiar with. These are the least common type of question on the test and do not appear on every ACT.

- **Compare/Contrast:** These questions are only in the conflicting viewpoints passage and ask you to consider various aspects of opposing or alternative arguments.

The most difficult part of the Science Test is that you have never worked on this in school, so there is a learning curve. You have taken math courses, learned grammar rules, and done reading comprehension, but I bet you have never met anyone who has taken a "reading charts and graphs" class. **The Science Test feels very uncomfortable to many students at first.** The best way to conquer the ACT Science Test is to understand the common types of questions, learn the proper approaches and strategies, and to work through a bunch of practice ACTs. **With practice, you will begin to feel much more comfortable and confident on this section.**

Chapter 1: How to Approach the Passages

At first glance, science passages often look intimidating. These is so much information and the random topics of each passage, such as the migratory patterns of monarch butterflies or the crystallization magma, are often unfamiliar to students. Students facing the ACT Science Test often ask the following questions?

Charts & Graphs Strategies and Approach

Of the six passages on the Science Test, five of them will consist of mostly graphs, charts, tables, and figures. The other one section will be the conflicting viewpoints passage. We will first discuss how to approach the five non-conflicting viewpoint passages.

Most of the information in the charts and graphs passages is extra and unnecessary. The majority of the questions can be answers by just using the charts and graphs and not using the text at all. Don't spend time trying to read and understand the entire passage…it's not necessary and you will run out of time! Instead, spend around 30 seconds before starting on the questions. In these 30 seconds, focus on the charts and graphs, paying special attention to the labels of the axes, what is being measured in each chart, and where information is located. As for the text, just read the first sentence of the passage and of the experiment(s) to just know the basics of what the passage is about. After these 30 seconds, you will not fully understand the passage, but that is okay. You now know where the information is and can proceed to the questions.

Within each passage, the questions go from easy to hard. The first two or three questions are generally very straightforward, often just asking you to spot a trend or find a data point. As you continue to the later questions in the passage, they can get more difficult by asking you to use experimental thinking, use multiple charts or graphs, or consider a change to the experiment. Since each question is worth the same amount, be sure to get the easy ones correct. If you cannot figure out one of the last two questions in the passage, bubble in your best guess, circle the question, and move on. You can always come back to it at the end if you still have time. It is better to take your best guess and keep moving onto the next passage rather than spend a bunch of time on the most difficult questions and run out of time at the end of the section.

You want to find the easiest and faster way to get the correct answers. Remember to trust the questions. If a question begins with "Based on Figure 2," it means that the answer is in Figure 2. Go to Figure 2 and find it! The ACT is not trying to trick you, so let the questions help guide you to the right part of the passage. If the question does not direct you where to go, use the keywords in the question or answer choices to help you. Finding the variables discussed or units of the answer choices can quickly direct you to the right part of the passage. Throughout this process, remember that you do not need to understand the experiment as a whole. As long as you can find the answer in the passage, just bubble it in and move on.

If you read a question and you see a term or word that you do not know or cannot find in the charts or graphs, it is time to go back to the text. As we have already said, most questions on the Science Test do not require you to know the definitions of the variable. However, if you do need the definition, it will be in italics, making it easy to scan the passage and find them quickly. Read the definition and then answer the question.

Throughout the entire Science Test, it is very important to keep yourself moving. Time management is crucial in this section, as it is often the hardest one for students to finish. You should be spending between 5-6 minutes on each passage. If you find yourself spending more than 30 seconds on a

problem, bubble in your best guess, circle the number, and move on. You can always come back if you have time at the end.

Conflicting Viewpoints Strategies and Approach

At some point in the Science Test, you will find the one Conflicting Viewpoints passage. This passage should be easy to spot by looking for headings like "Scientist 1," "Scientist 2" or "Student 1," "Student 2". This passage also generally has more text and sometimes have no charts or graphs at all. It is important to spot the passage quickly, as you must approach it differently than the other five passages.

Rather than skimming the passage, you must treat this more like a reading passage, reading and annotating the entire thing. As you read, it is good to underline or write down the key differences between the viewpoints. Having these notes will help you work more quickly on the questions rather than having to re-read the text over and over again.

There are a variety of strategies for approaching this passage, but most students will save this passage for last, as it is the most time consuming. Reading the text takes longer than skimming charts, graphs, tables, and diagrams, and the Conflicting Viewpoints passage is often more difficult than others. If you may run out of time, it is best to run out of time on the most time-consuming passage.

Overall, the Science Test is a difficult passage and takes some practice to get comfortable with and see improvements. Of course, it makes things even worse that it is the final section on the ACT. The best way to improve is to practice! Get ready to work through lots of practice sections to get comfortable with the pacing of the section and get accustomed to the types of questions. This section may never be your favorite, but over time you will get much more "comfortable with being uncomfortable" and will be able to succeed on the Science Test.

Other Tips

Tip #1 – Use the answer choices to help save time

On many questions, you will be able to use the answer choices to help you more quickly find the correct answers. The answer choices in questions referring to charts and graphs will provide certain numbers, units, or categories that can help limit down what part of the graph or chart you must use to find the correct answer. Using the answer choices can also help you quickly eliminate incorrect answers that do not match the information in the figure. For other types of questions, such as the scientific knowledge or method questions, the answer choices will help you quickly realize which questions require you to go back to the text for more information and which questions are just asking you to use your own knowledge and experimental thinking. Some questions are just asking you to apply your own knowledge, so you do not want to waste time going back to the passage if you do not need to. With experience, you will be able to use the answer choices to help improve your time management on the Science test.

Tip #2 – It's okay to answer questions before understanding it all

One of the biggest challenges on the Science test is the amount of information that you are given in each passage. Many passages are on random topics that you likely know little to nothing about. Are you an expert on the growth rates of peat moss? I don't think so! Your only job in this section is to answer questions correctly, not be an expert on the experiment. As a result, you will often begin answering questions before you really understand what is going on in an experiment. There is nothing wrong with feeling a bit lost at times in this section. It actually means that you are managing your time well. Even

the most skilled students will sometimes feel a bit lost in this section, but that is just part of the challenge. Remember, all you need to do is find the correct answers, not actually be able to explain the entire experiment.

Question Diagnosis

The most important for success on the Science Test is to know where to look for information in the passage. **When you read a question, be sure to read both the question and the answer choices.** Both the question and the answer choices will provide big clues that will direct you where to look in the passage. As you get better at question diagnosis, you will be able to more quickly and consistently locate the correct information in the passage, manage your time better, and improve your score.

To start, we will introduce you to the 4 places to look in a Science Passage and tell you when to go to each part.

1) Figures and Tables

The most common place that you will need to go to for an answer is in the Figures and Tables. The question will tell you which Figure or Table to look at (Ex: Based on Figure 1…), so just go to that Figure or Table and find the answer. Most of the Figures and Tables questions can be answered without using any of the text at all.

When to go to Figures and Tables:

- The question directs you by saying "Figure 1," "Table 1, " etc.
- The answers are all numbers with units.

2) Experimental Text

For questions that ask you about the setup of the experiment, you will often need to go to the experimental text right above the Figure and Tables. This text will explain what the Table or Figure is showing, tell you the values of other variables that are not shown in the Figures or Tables, and give you other relevant information about the experiment. Most often, you need to go to this text if there is a question about the differences between multiple experiments.

When to go to the Experimental Text:

- The question asks about the setup an experiment or differences between experiments
- The question asks about variables that are not in the Figures or Tables
- The answer choices have units that are not in the Figures or Tables

3) Introductory Text

For some questions, you will need to go back to the text at the beginning of the passage. You will most likely need to go back to the introductory text to get definitions of words or terms in the passage that you are not familiar with. For example, if a question has the term RM in it and you need to know what that term means to answer the question, the introductory text will tell you that RM stands for Reactive Material.

When to go to the Introductory Text:

- Terms or scientific words appear in the question that you need to know
- If you have already looked at the Experimental Text and did not find the information that you need

4) Not in the Passage (Basic Science Knowledge & Experimental Thinking Questions)

Some questions on the Science Test will not be based on the information presented in the Passage. For these questions, you will need to apply basic science knowledge or experimental thinking to identify the correct answer. As we work through this section, you will learn how to recognize these questions.

Example Passage:

The passage below labels the three main place in the passage to look at for answers: Figures and Tables (1), Experimental Text (2), and Introductory Text (3).

Passage IV

3

The *octane number* of a fuel is a measure of how smoothly the fuel burns in a gasoline engine. Lower octane fuels *knock* (explode) when burned, which lowers fuel efficiency and can cause engine damage. Heptane knocks considerably when burned and is given an octane number of 0. Isooctane knocks very little and is given an octane number of 100.

Different proportions of heptane and isooctane were mixed to obtain mixtures with octane numbers between 0 and 100 (see Table 1).

1

Table 1

Volume of heptane (mL)	Volume of isooctane (mL)	Octane number
0	100	100
10	90	90
25	75	75
50	50	50
90	10	10
100	0	0

Experiment 1

2

A sample of each fuel mixture listed in Table 1 was burned in a test engine at an engine speed of 600 revolutions per minute (rpm). The number of knocks per minute was determined for each mixture. This was done so that an octane number could be assigned to any fuel by measuring its knock rate.

Experiment 2

2

Adding tetraethyllead (TEL) to a fuel changes its octane number. Different amounts of TEL were added to 1,000 mL samples of isooctane. Each fuel mixture was tested under the same conditions used in Experiment 1, and the measured knock rate was used to determine the octane number (see Figure 1).

1

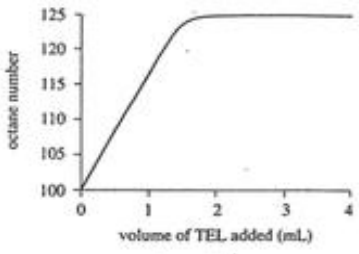


Figure 1

Experiment 3

2

The *engine octane requirement* (EOR) is the minimum octane number of a fuel required for an engine to operate without becoming damaged. Fuels A and B were burned separately in an engine at different speeds. Table 2 shows the octane number determined for each fuel at each engine speed and the known EOR of the engine at each speed.

1

Table 2

Engine speed (rpm)	EOR	Octane number in engine of: Fuel A	Fuel B
1,500	97.4	98.4	96.7
2,000	95.3	96.6	96.1
2,500	93.5	95.0	95.4
3,000	91.9	92.3	93.8
3,500	90.6	90.9	92.5

Figures & Tables Question Types

1) Specific Data Point

Many of the easiest questions on the ACT Science Test will simply ask you to go to the Figures and Tables and find a specific data point. To do this successfully, you must read the question carefully to know exactly what you are being asked to find. Pay special attention to the axes and the legends to make sure you find the exact data point the question is asking for.

TIP – How To Spot Specific Data Point Questions

Specific data point questions are easy to spot because (1) the questions will tell you which chart to look at to find the answer and (2) all of the answer choices will be numbers with units.

1) Let the Questions Help You

Many questions will directly tell you which Figure or Table to look at:

According to Figure 2,… Based on Table 1,…. The data in Figure 1 show….

If the question says, "Based on Figure 1," go to Figure 1! The ACT is not trying to trick you; it is telling you where the answer is.

2) **Pay Attention to the Answer Choices**

The answer choices also give away specific data point questions. If you see all numbers with units in the answers, you are most likely dealing with a specific data point question.

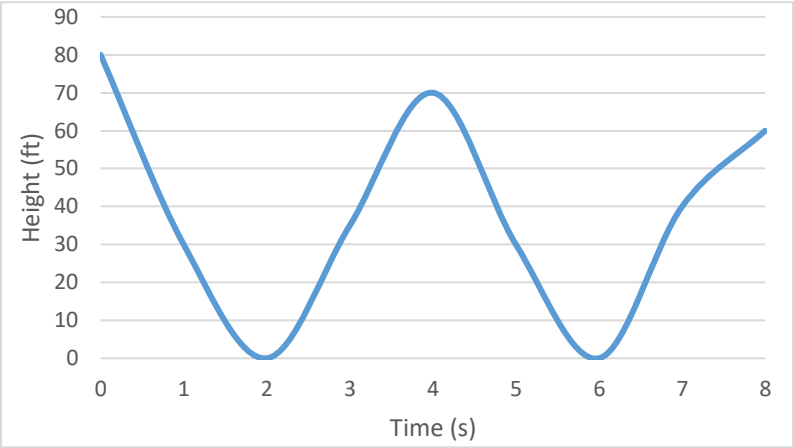
Example: Based on Figure 3, the average depth of the tomato plant roots at 17 days was:

A. 5 cm
B. 8 cm
C. 12 cm
D. 18 cm

Remember to pay attention to the units in the answer choices. The units will help you make sure you are looking at the correct axis of a graph or the correct data in a table.

Specific Data Point Practice Problems:

The chart below shows the position of a bouncing ball over time after it is released at t=0 seconds.

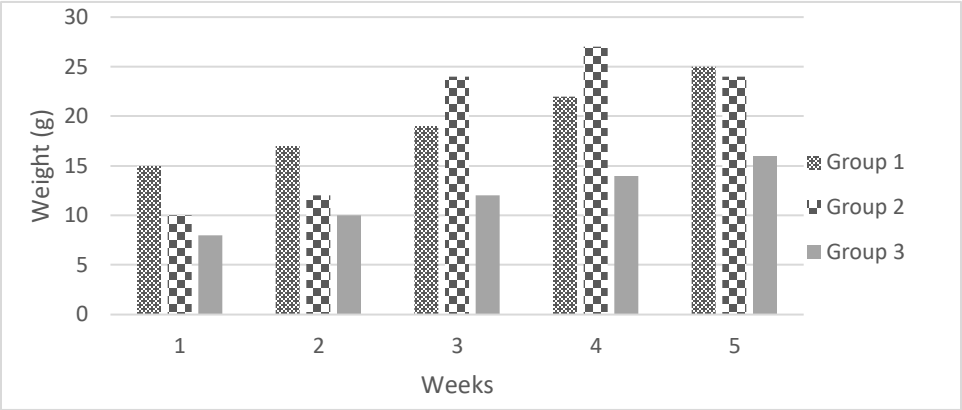


1. Based on Figure 1, at 3 seconds, how high is the bouncy ball?
   A. 0 feet
   B. 35 feet
   C. 50 feet
   D. 80 feet

2. Based on Figure 1, at 4 seconds, how much lower in feet is the ball from its starting position?
   A. 0 feet
   B. 10 feet
   C. 70 feet
   D. 80 feet

3. Based on Figure 1, how many seconds had passed when the ball hit the ground for the second time?
   A. 1 second
   B. 2 seconds
   C. 4 seconds
   D. 6 seconds

The figure below shows the average weight for 3 different groups of mice over a 5-week period. The weights of the mice were recorded at the end of each week.



4. Based on Figure 2, after 1 week of the experiment, the mice in group 2 weighed:
   A. 5 g
   B. 10 g
   C. 15 g
   D. 20 g

5. Based on Figure 2, at week 5, group 1 weighed:
   A. 10 g
   B. 16 g
   C. 20 g
   D. 25 g

6. At week 4, which properly shows the order of the weights of groups 1, 2, and 3 from largest to smallest?
   A. 3, 2, 1
   B. 2, 3, 1
   C. 3, 1, 2
   D. 2, 1, 3

2) Trends

Another common type of Figures and Tables question on the ACT asks you to spot trends. These questions can range in difficult from very easy questions that simply ask you to track how number change across a graph to difficult questions that ask you to identify non-obvious trends within tables.

When you are asked to spot trends, focus on identifying the pattern in the data and do not worry about the specific numbers. As always, read the questions carefully to make sure you are looking at the correct data that the question is asking about.

TIP – How To Spot Trends Questions

The easiest way to spot a trends question is to use the answer choices. If you see answer choices that say "increases only" or "remains constant," these will let you know that you are dealing with a trends question.

Example: As the temperature decreases, the angle of the rose bush stems:

A. Increased only
B. Increased then decreased
C. Decreased only
D. Remained constant

Trends on Charts & Graphs Practice Problems:

Four different forests were treated successively with 3 different fertilizers. Each fertilizer treatment lasted four months. Fertilizer 1 was used first and then followed by fertilizers 2 and 3. The tree growth was measured after each treatment was completed.

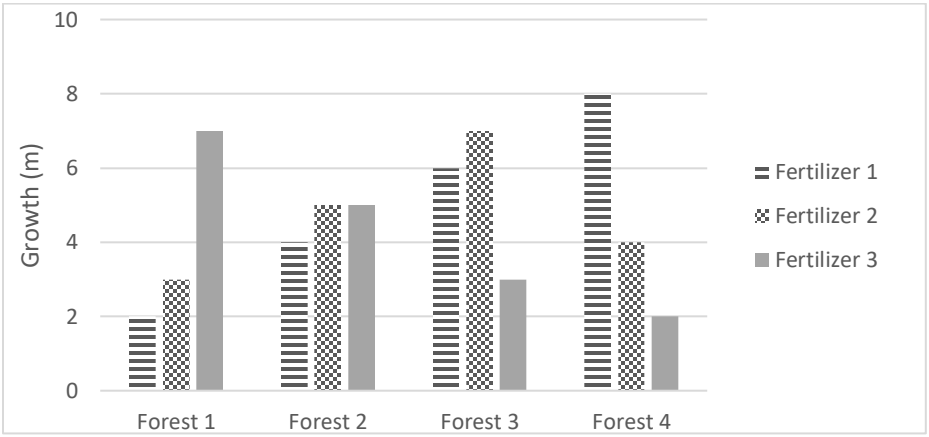


Figure 1

1. Based on Figure 1, after each successive fertilizer treatment, the growth in meters of the trees in Forest 1:
   A. Decreased only
   B. Increased only
   C. Increased then decreased
   D. Varied with no general trend

2. Based on Figure 1, from Forest 1 to Forest 4, Fertilizer 3 showed levels of growth in meters that:
    A. Decreased only
    B. Increased only
    C. Increased then decreased
    D. Varied with no general trend

3. Based on Figure 1, after each successive treatment, the growth in meters in Forest 4:
    A. Decreased only
    B. Increased only
    C. Decreased then increased
    D. Varied with no general trend

Trends In A Table

On the ACT, more difficult trends questions often appear in passages with large data tables. The challenge on these questions is to identify which parts of the table to look at. Often, you cannot look at the table as a whole but instead need to find a few trials to look at. To do this, you will need to read the question carefully, identify which variable(s) should be changing and which ones should remain constant, and finally find which trials will show the trend you are being asked about.

When trying to identify trends in table, you will want to look at groups of trials where only one independent variable is being changed. This way you can spot the trend based upon how the independent variable affects a dependent variable.

Let's practice this skill by using the small table below.

Directions: Determine which 2 trials we need to look at to compare the two given categories:

1. Density and Pressure

2. Volume and Pressure

	Temp. (^oC)	Volume (L)	Density (kg/m^2)	Pressure (atm)
Trial 1	80	30	5	1
Trial 2	80	50	5	2
Trial 3	100	50	5	2
Trial 4	100	50	10	6

Trends in Tables Practice Problems:

Use the information in the table below to answer the questions.

Trial	M (m)	A (m/s)	X (w/a)	T (°C)	F (N)
1	3	4	6	10	12
2	5	4	8	10	12
3	7	4	10	10	12
4	3	4	5	10	18
5	3	4	4	10	24
6	3	4	1	10	30
7	3	8	11	10	12
8	3	10	13	10	12
9	3	12	15	10	12
10	3	4	25	15	12
11	3	4	30	20	12

Table 1

1. A controlled variable is a variable that is held constant. What were the controlled variables in Trials 4-6?
   A. F, T, X
   B. F, M, A
   C. M, A, T
   D. M, A, X

2. Based on Table 1, as F increases X:
   A. Decreases only
   B. Increases only
   C. Remains constant
   D. Increases then decreases

3. Based on Table 1, as A increases X:
   A. Increases only
   B. Decreases only
   C. Remains constant
   D. Increases and then decreases

4. Based on Table 1, which of the following combinations of M, A, T, and F would yield the greatest value for X?

	M	A	T	F
A.	3	4	10	12
B.	3	8	20	30
C.	7	4	10	30
D.	7	8	20	12

5. A scientist wants to find out how varying F affects the value of X. To do this, the scientist should look at which trials from Table 1?

   A. Trials 1 - 3
   B. Trials 3 - 6
   C. Trial 1 and Trials 4 - 6
   D. Trials 6 - 9

3) Approximation

Approximation questions will ask you to estimate the value of a data point that is not specifically given in the Figures and Tables. To answer these questions, you will need to use the given values to estimate where the data point the question is asking to you to find would appear.

TIP – How to Spot Approximation Questions

Approximation questions are easy to spot since the answers give them away every time! All you need to look for is answers that look like this:

A) Less than 100m
B) Between 100m and 150m
C) Between 150m and 250m
D) Greater than 250m

Every time you see answer choices like this, it is an approximation question. Remember, this means the question will be asking about a value that is not actually in Figures or Tables.

Approximation On Graphs

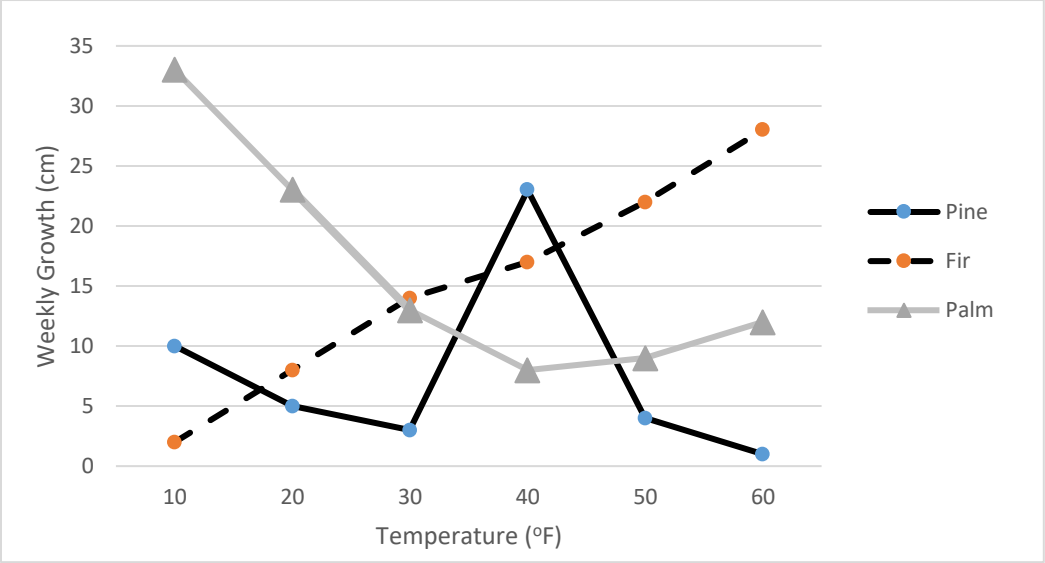
Approximation questions on a graph will be one of two types: bracketing or extending.

For the bracketing questions, you will be asked to find a data point that is between two given data points. To find the correct data points to use, simply consider what data points the value the questions is asking you to find fits between. Once you find the correct data points on the graph, it should be easy to spot the correct answer.

Extending questions will instead ask you about a data point that is outside of the graph. For extending questions, **simply take your pencil and extend the trend line outside of the graph**. The answer should be easy to spot after that.

Approximation on Graphs Practice Problems:

Seedlings of pine, fir, and palm trees were grown in a laboratory where the temperature could be controlled. Five seedlings of each tree were grown at six different temperatures for 1 week. The scientists measured the height of the seedlings at the beginning and end of the week. The weekly growth shown in Figure 1 was calculated by averaging the growth of all five seedlings.



1. According to Figure 1, at 45° F, the weekly growth rate of Pine would most likely have been:
   A. Less than 5 cm
   B. Between 5 cm and 10 cm
   C. Between 10 cm and 20 cm
   D. Greater than 20 cm

2. According to Figure 1, at 70° F, the weekly growth rate of Palm would most likely have been:
   A. Less than 5 cm
   B. Between 5 cm and 10 cm
   C. Between 10 cm and 20 cm
   D. Greater than 20 cm

3. According to Figure 1, when the weekly growth rate of the Fir tree is 10 cm, the temperature would most likely have been:
   A. Less than 10° F
   B. Between 10° F and 20° F
   C. Between 20° F and 30° F
   D. Greater than 30° F

Approximation in Tables

When facing approximation questions in tables, you will need to be able to locate the right data points in the table to look at. For easier questions, you can follow trends across the entire table. For more difficult questions, you will need to identify which specific trials will help you find the less obvious trends. Be sure to pay careful attention the other variable(s) in the table, as the variable(s) that are not part of the question should remain constant.

Approximation in Tables Practice Problems:

Trial	M (m)	A (m/s)	X (w/a)	T (°C)	F (N)
1	3	4	6	10	12
2	5	4	8	10	12
3	7	4	10	10	12
4	3	4	5	10	18
5	3	4	4	10	24
6	3	4	1	10	30
7	3	8	11	10	12
8	3	10	13	10	12
9	3	12	15	10	12
10	3	4	25	15	12
11	3	4	30	20	12

Table 1

1. Based on Table 1, if M had been 9 in Trial 3, X would most likely have been:
    A. Less than 4 w/a
    B. Between 4 w/a and 7 w/a
    C. Between 7 w/a and 9 w/a
    D. Greater than 10 w/a

2. Based on Table 1, if F had been 27, X would most likely have been:
    A. Less than 1 w/a
    B. Between 1 w/a and 4 w/a
    C. Between 4 w/a and 5 w/a
    D. Greater than 5 w/a

4) Multiple Figures

More difficult questions on the ACT Science Test will require you to use multiple Tables or Figures to find the right answer. To answer these questions successfully, you will need to find out how the multiple figure or tables are related. Most commonly, you will need to find a data point on the first figure or table, use that data point to direct you to the right piece of information on the second figure or table, and finally use that second piece of information to find your answer. We know that sounds really complicated on paper, but once you get the hang of it these questions are not that bad!

TIP – How To Spot Multiple Figures Questions

For multiple figures questions, the text in the question will direct you to consider multiple studies, experiments, figures or tables.

For easier questions, the question will tell you exactly where to look.

Based on Figures 1 and 2, …. According to Table 1 and Figure 3,…..

For more difficult questions, the question may instead simply direct you to look at multiple studies or experiments or just consider the overall data. On these questions, you will need to do a bit more work to identify which charts or tables are the important ones to consider.

Based on Experiments 1 and 2, The data in Studies 2 and 3 shows….

According to the results of the studies,… The experiments indicate…

Be sure to read the more difficult questions carefully and identify the key words that will help you know which Figures and Tables to look at. Also, remember to pay close attention to the labels on the axes as well, as these will help guide you to the data that you need.

Using the Text Above the Figures and Tables

On some of the multiple figures questions, you may need additional information that is not located in the Figures or Tables. **If the question asks you about information that is not in the Figures or Tables, look in the text above that describes the setup of the experiment to help.**

For example, if a question asks you, "How many Trials were run without electricity?" and there is no electricity in any of the charts or graphs, go to the text describing the experiment. That's where you will find the information you need to answer the question.

Multiple Figures Practice Problems:

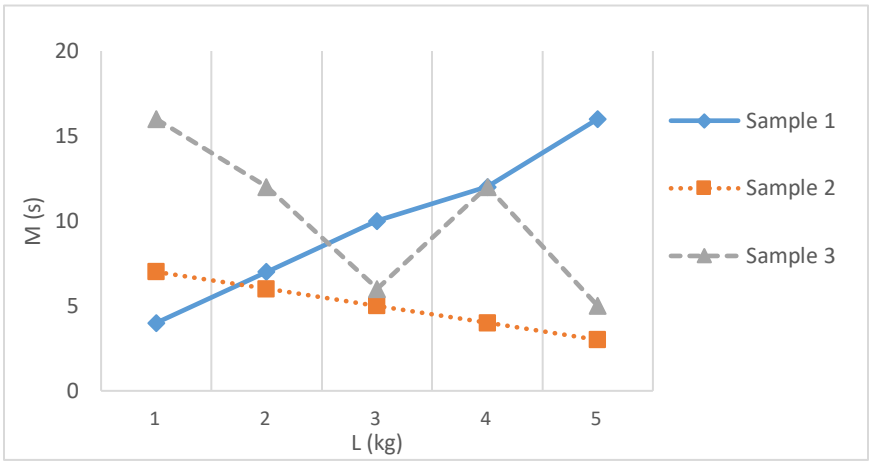


Figure 1

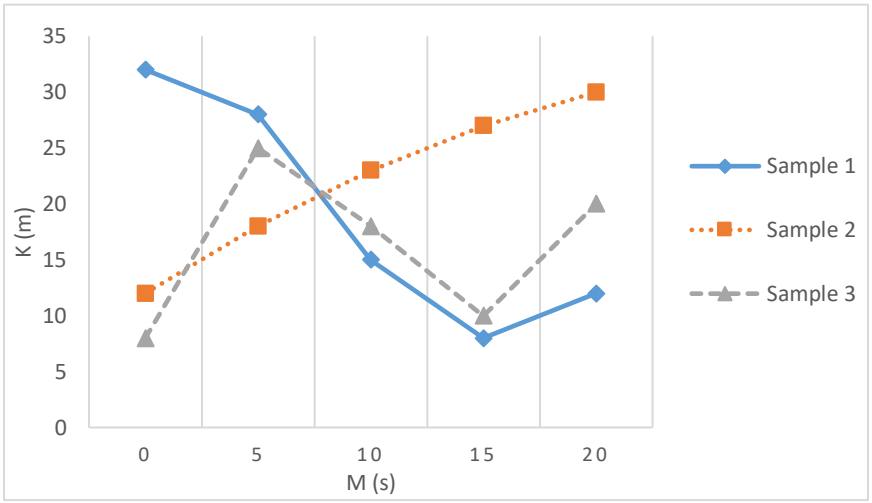


Figure 2

Table 1 below shows the relationship between values of K and Z for Samples 1, 2, and 3.

Table 1

	Sample 1	Sample 2	Sample 3
Z (°F)	K (m)	K (m)	K (m)
50	21	10	30
40	28	18	25
30	16	27	16
20	20	31	10

1. Based on Figures 1 and 2, when Sample 3 has an L of 5, it has a K of what?
    A. 8 m
    B. 15 m
    C. 20 m
    D. 25 m

2. Based on Figures 1 and 2, when Sample 1 has a K of 15, it has a L of what?
    A. 1 kg
    B. 2 kg
    C. 3 kg
    D. 4 kg

3. Based on Figure 2 and Table 1, when Sample 3 has a M of 15, it has a Z of what?
    A. 50 °F
    B. 40 °F
    C. 30 °F
    D. 20 °F

4. A new trial for Sample 2 was repeated at 15°F. Based on the results of the experiments, the M value for Sample 2 is most likely:
    A. Less than 10s
    B. Between 10s and 15s
    C. Between 15s and 20s
    D. Greater than 20s

Tables 3 and 4 show the results of an experiment about the density of 6 different types of bones.

Bones	Density
1	98%
2	43%
3	23%
4	76%
5	52%
6	32%

Table 3

Density	BMC
100%	500
80%	406
60%	312
40%	208
20%	101

Table 4

5. Based on Tables 3 and 4, a BMC of 367 is most likely associated with which bone?
   A. Bone 1
   B. Bone 4
   C. Bone 5
   D. Bone 2

6. Based on Tables 3 and 4, which bone has the lowest BMC?
   A. Bone 1
   B. Bone 2
   C. Bone 6
   D. Bone 3

7. Based on Tables 3 and 4, which of the following is closest to the BMC of bone 6?
   A. 420 BMC
   B. 243 BMC
   C. 158 BMC
   D. 110 BMC

5) Figures + Text

On certain questions, the information in the Figures and Tables is not enough. If you find that you need more information to answer the question, look at the experimental text. Most often, the questions will ask you about certain units or values for a specific term that are not included anywhere in the Figures or Tables. If this happens, just go to the text above the Figures or Tables and find the information there.

Figures + Text Practice Questions:

Study 1

The two figures below show a model of a person jumping off of a 1000-foot bridge. At time = 0 seconds, the person makes his jump off of the bridge at point Z. The only force acting on the bungee jumper after jumping off of the bridge is gravity. At time = 10 seconds, the bungee jumper reaches his minimum height at point Q. As the bungee cord is stretched out to its maximum length, it generates enough tension force to catapult the bungee jumper back upwards. Figure 2 shows the bungee jumper's velocity throughout the bungee jump. Downward velocities are graphed negatively.

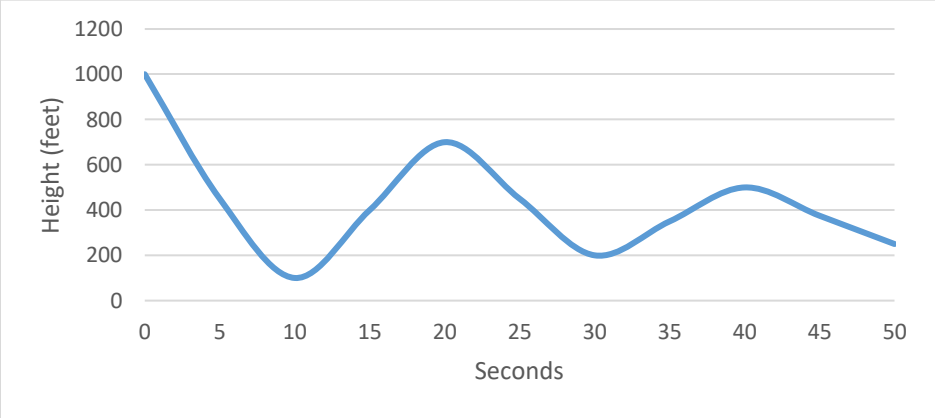


Figure 1

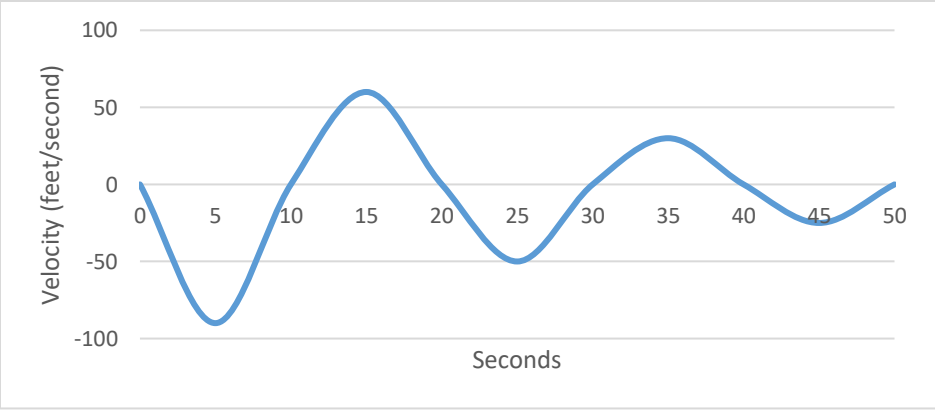


Figure 2

1. Based on Figures 1 and 2, at what time does the bungee jumper touch the ground?
    A. 10 seconds
    B. 20 seconds
    C. 30 seconds
    D. At no time

2. Based on the results of the study, what is the velocity of the bungee jumper at point Z?
    A. 0 feet / second
    B. - 90 feet / second
    C. 60 feet / second
    D. 1,000 feet / second

3. How much lower is the bungee jumper from the maximum height when he is at point Q?
    A. 0 feet
    B. 300 feet
    C. 500 feet
    D. 900 feet

4. Based on the results of the study, when the bungee jumper is at the maximum positive velocity, what is his approximate height?
    A. 100 feet
    B. 400 feet
    C. 600 feet
    D. 700 feet

Experiment 1

Four grass fields with only Kentucky Blue grass were planted next to one another in order to test different factors for the growth of grass.

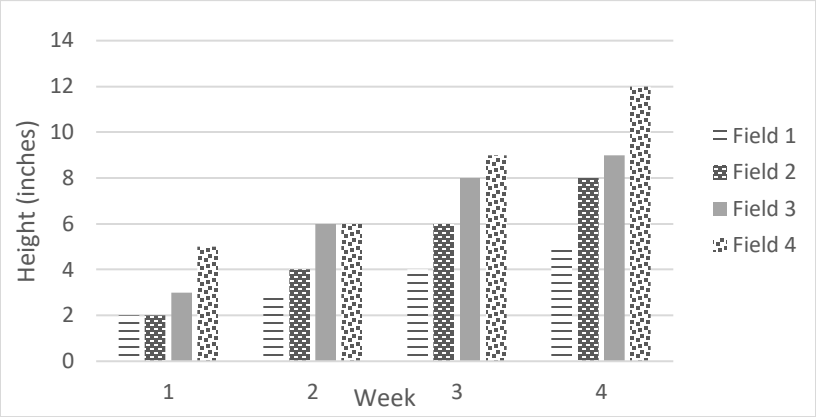


Figure 1

Field	Overwater	Pesticide A	Fertilizer
1	Yes	No	No
2	No	No	No
3	No	Yes	No
4	No	No	Yes

Table 1

Experiment 2

The same conditions as field 4 were met except field 5 contained Bent grass, field 6 contained Bermuda grass, and field 7 contained Avena Fatua, a common weed.

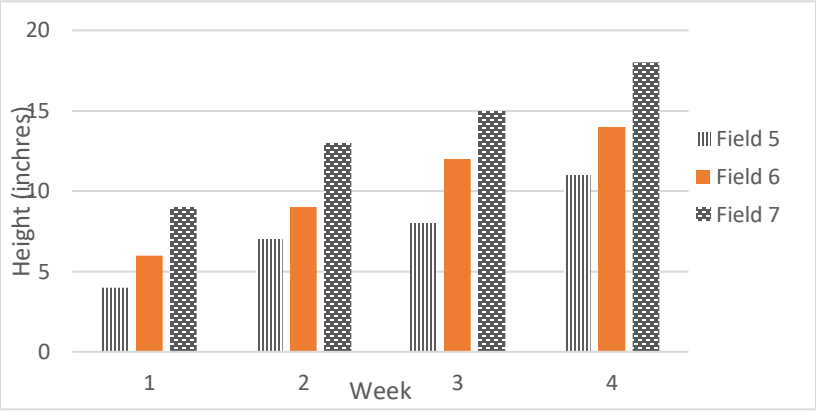


Figure 2

5. Based on Figure 1 and Table 1, the height of the grass in field that was overwatered at week 3 was:
    A. 4 inches
    B. 6 inches
    C. 8 inches
    D. 9 inches

6. In Experiments 1 and 2, which field had the tallest grass?
    A. Field 4
    B. Field 5
    C. Field 6
    D. Field 7

7. In Experiments 1 and 2, how many fields were treated with fertilizer?
    A. 1
    B. 3
    C. 4
    D. 7

8. Based on the experiments, was overwatering helpful or harmful for the growth of the Kentucky Blue grass?
    A. Helpful, the grass in field 4 was taller than the grass in field 3
    B. Helpful, the grass in field 1 was taller than the grass in field 2
    C. Harmful, the grass in field 3 was taller than the grass in field 2
    D. Harmful, the grass in field 2 was taller than the grass in field 1

Advanced Question Types

1) 2-Part Answers

On the ACT Science Test, you will see many questions with two parts in the answers. **On these questions, you should always break the answers into two parts and work to answer one part at a time. We recommend starting with the second part of the answer (the explanation) and the answering the first part (the claim) last.**

The second part of the answer is usually based on the Figures and Tables or basic scientific knowledge and is much easier to validate than the first. You can use the second part to eliminate incorrect answers and then work on the claims in the first part. Even if you cannot tell exactly which claim is correct, you should at least be able to eliminate 2 answers as incorrect and be guessing between just 2 answers.

2-Part Answers Practice Questions:

How to Spot 2-Part Answer Questions

Of course, the 2-part answer choices will give away these questions. One important thing to be aware of is that there is usually a pattern to most of the 2-part questions. For the first part (the claim), answer choices A and B match and answer choices C and D match. For the second part, answer choices A and C match and answer choices B and D match.

Example: Based on Experiment 1, would the amount of liquid collect at the study change if the study was repeated at a temperature of 105^{o}C?

A. Yes, because the boiling point of water is below 100^{o}C
B. Yes, because the boiling point of water is above 100^{o}C
C. No, because the boiling point of water is below 100^{o}C
D. No, because the boiling point of water is above 100^{o}C

Using this pattern can help you save time and get to the right answers faster.

With that being said, you need to always read the answers carefully, as some questions do not follow the same pattern.

Example: Based on Figures 1 and 2, does the hummingbird or sparrow show a greater increase in flight distance from June to July?

A. The hummingbird, because D from July to August increased by 0.8 miles
B. The hummingbird, because D from July to August increased by 1.6 miles
C. The sparrow, because D from July to August increased by 1.2 miles
D. The sparrow, because D from July to August increased by 2.0 miles

Figure 1 shows how the combustibility of three solvents varies with temperature.

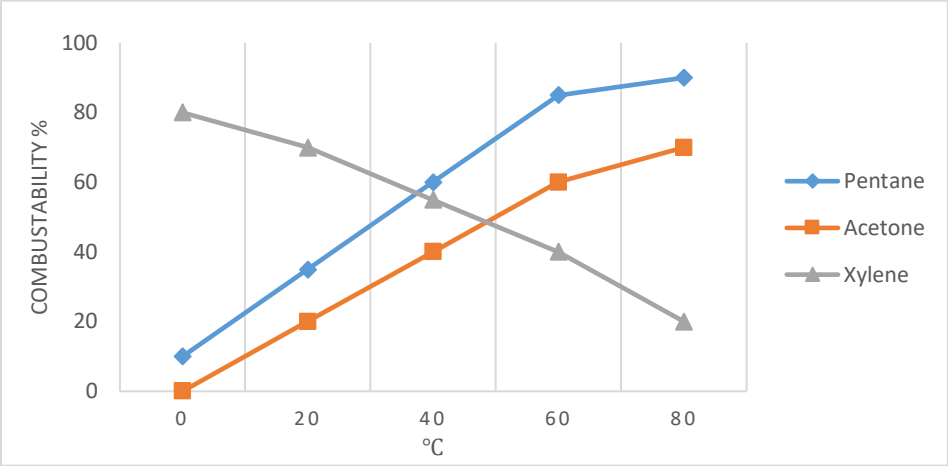


Figure 1

1. A science journal claimed that Acetone was the most likely to combust at 40 °C. Does Figure 1 support this claim?
   A. Yes, acetone has the highest percent combustibility at 40 °C.
   B. Yes, acetone has the lowest percent combustibility at 40 °C.
   C. No, acetone has the highest percent combustibility at 40 °C.
   D. No, acetone has the lowest percent combustibility at 40 °C.

2. A science journal claimed that for all compounds, percent combustibility increases as temperature increases. Does chart 1 support this claim?
   A. Yes, for all three compounds percent combustibility increases as the temperature does.
   B. Yes, xylene's percent combustibility decreases as the temperature increases.
   C. No, for all three compounds percent combustibility increases as the temperature does.
   D. No, xylene's percent combustibility decreases as the temperature increases.

3. A follow-up study is examining how pentane, acetone, and xylene behave in direct sunlight. The scientists are trying to control for combustibility, so it does not affect the results of the study. Based on Figure 1, should the study be performed at 40°C or at 20°C?
   A. 40°C, because the percent combustibility of all three solvents are close together
   B. 40°C, because the percent combustibility of two of the three solvents is close together
   C. 20°C, because the percent combustibility of all three solvents are the close together
   D. 20°C, because the percent combustibility of two of the three solvents is the close together

2) Cannot Be Determined

When you see "cannot be determined" as an answer choice, do not treat the question any differently. Start with the Figures and Tables and, if you cannot find any information there, move onto the text above the experiments. You will want to choose the "cannot be determined" answer when the locators from the question cannot be found on the figure.

Pay close attention to the units for these questions, as many difficult "cannot be determined" questions will use different units to try to trick you.

Cannot Be Determined Practice Problems:

Study 1:

4 groups of rats were fed four different foods over a 4-week period to monitor their gain in weight. Each group was fed just 1 food for the entire study. The rats were fed cookies, bananas, coconut, or chips. The results of the study are below.

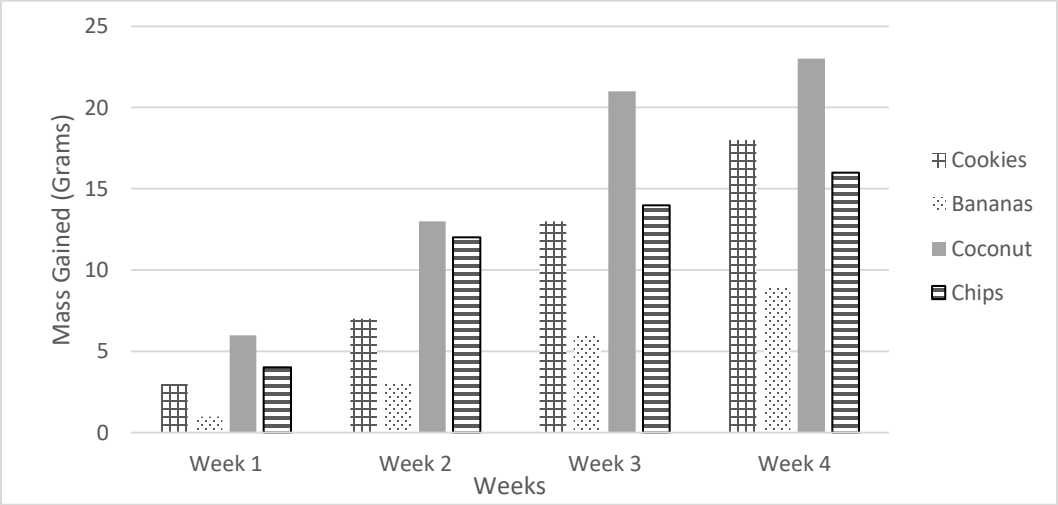


Figure 1

1. Based on Figure 1, how many grams of food per week were the rats fed.
   A. 5 grams
   B. 10 grams
   C. 15 grams
   D. Cannot be determined

2. Based on Figure 1, the group that was fed which food weighed the most at the end of the experiment.
   A. Cookies
   B. Coconut
   C. Chips
   D. Cannot be determined

Experiment 1

15 dogs were split into three evenly sized groups. Each group was then given 1 of the 3 types of food trays. The three types of food trays each contained the same 4 types of foods. However, the percentages of each type of food differed for each of the three trays. Figure 1 shows how much food was remaining at different times. Table 1 shows the percent by mass that each tray of food was made up of.

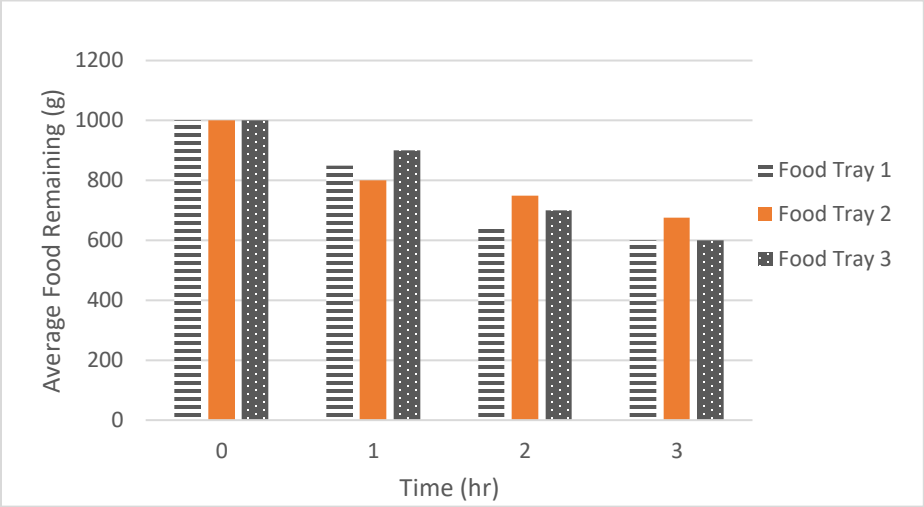


Figure 1

Food Tray	Percent By Mass			
	Chicken	Grain	Steak	Fruit
1	25%	25%	25%	25%
2	50%	20%	15%	15%
3	30%	20%	50%	20%

Table 1

3. According to Figure 1, how much food remained on average for the dogs fed food Tray 3 after 3 hours?
   A. 600 g
   B. 650 g
   C. 700 g
   D. 900 g

4. According to Figure 1 and Table 1, what percent of the chicken was consumed for the dogs fed with Food Tray 1 after 3 hours?
   A. 0%
   B. 40%
   C. 100%
   D. Cannot be determined

5. According to Experiment 1, can we determine how much food 1 of the 5 dogs fed food Tray 2 had consumed after 1 hour?
    A. Yes, Figure 1 gives the amount of food remaining for each dog.
    B. Yes, the percentages of food in Table 1 and Figure 1 tell us how much food is remaining for each dog.
    C. No, Figure 1 gives the total food remaining for the 5 dogs.
    D. No, the percentages of food in Table 1 and Figure 1 do not tell us how much food is remaining for each dog.

3) Equations as Answers

When you see equations as answer choices, you will be asked to identify which equation correctly models some information in the Figures or Tables. To answer these questions, start by picking a test point on the chart, graph, or table to plug into the equation. Then, use this point to identify which equation matches the data. If you are struggling to find points to use or to figure out the exact values in the graph, the endpoints of the graph are often easier to use.

Equations As Answers Practice Problems:

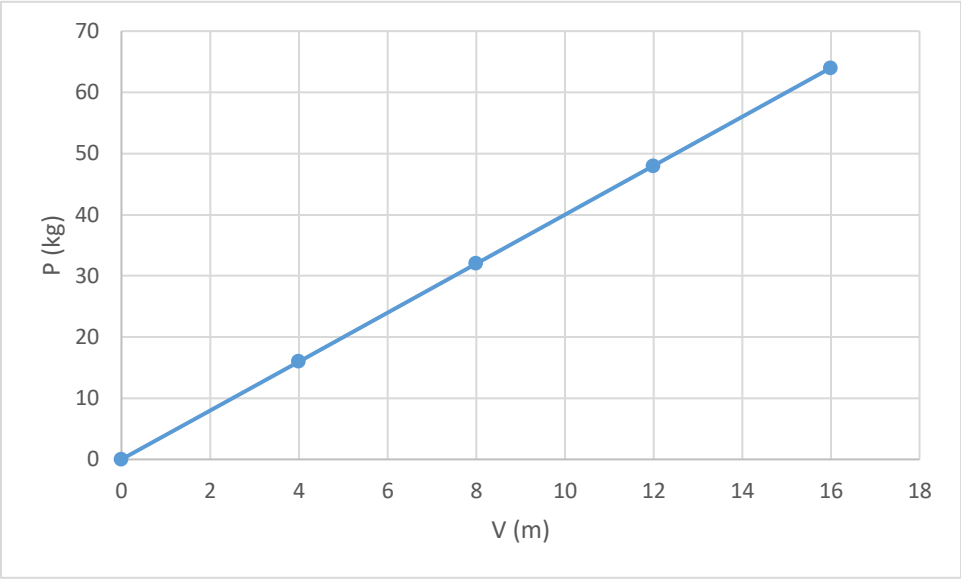


Figure 1

1. Based on Figure 1, which equation best models the results of the experiment?
   A. $V = 3P$
   B. $V = 0.5P$
   C. $P = 4V$
   D. $P = 0.5V$

2. Based on Figure 1, if V was 20 most likely what would the value of P be?
   A. 5 kg
   B. 20 kg
   C. 80 kg
   D. 100 kg

4) Mixing

Mixing problems are often some of the difficult problems that appear when you are dealing with multiple solutions in an experiment. Usually, these questions are one of the last two questions in a passage.

To answer these questions, you typically will need to identify the two solutions that you will need to combine to create the mixed solution. Then, you will need to use the data in the Figure or Table to discover where the new solution would appear. Answers to these problems often appear as bracketed ranges as we saw in the approximation problems.

Mixing Practice Problems:

Table 1	
Sample	Preservative Z (g)
1	10
2	4
3	3
4	7

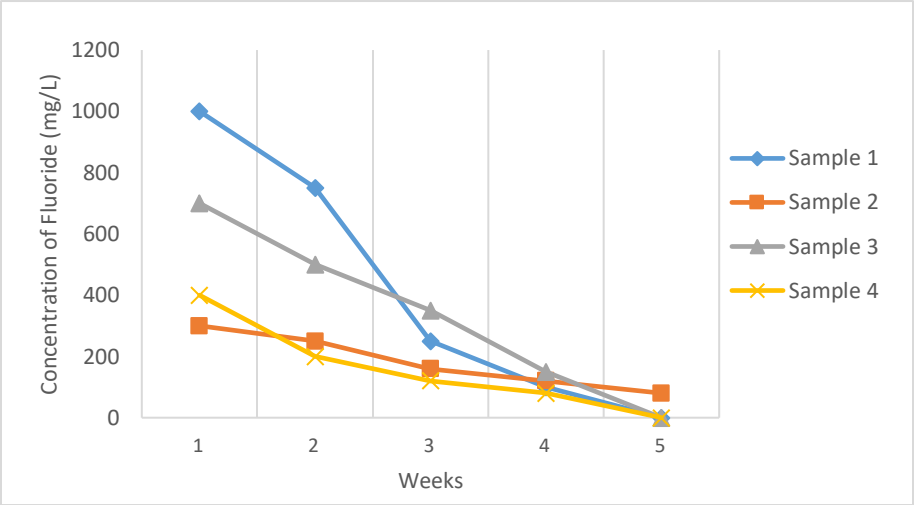


Figure 1

1. If a scientist mixed 1 L of Sample 1 and 1 L of Sample 2, what would the expected concentration of Fluoride mg/L most likely be at week 2?
   A. Between 100 mg/L and 300 mg/L
   B. Between 300 mg/L and 600 mg/L
   C. Between 600 mg/L and 900 mg/L
   D. Greater than 900 mg/L

2. If a sample had contained 6 grams of preservative Z, at week 1 where would the concentration of fluoride mg/L most likely have been?
   A. Less than 300 mg/L
   B. Between 300 mg/L and 400 mg/L
   C. Between 400 mg/L and 700 mg/L
   D. Greater than 700 mg/L

5) Scatter Plots

Scatter plot graphs are very common on the ACT. One important thing to know is that **the number of dots on the scatter plot tells you the number of times that the scientist collected data**. At times, scatter plot questions will ask you to spot how frequently data was being collected. This just requires you to just pay attention to the x-axis and then count the number of dots.

Scatter Plots Practice Questions:

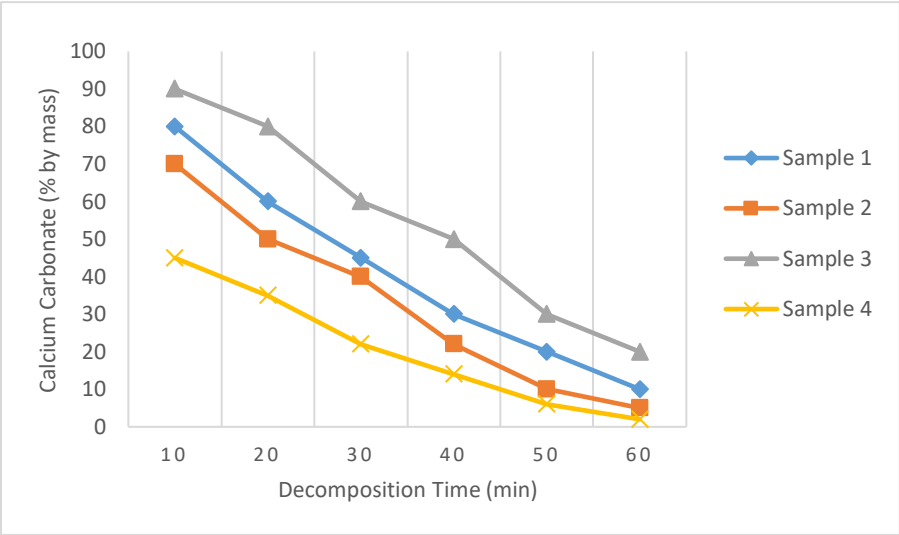


Figure 1

1. According to Figure 1, how often were each of the samples measured for the percentage of calcium carbonate by mass?
   A. Every minute
   B. Every 10 minutes
   C. Every 30 minutes
   D. Once per hour

2. If the samples were measured at the same frequency as in Figure 1, over a three-hour period how many times would the samples be measured?
   A. 6
   B. 12
   C. 18
   D. 24

6) Inverse Trends and Graphs with Multiple Axes

Inverse trends commonly appear on the more difficult questions at the end of passages. For these questions, you need to pay close attention to which way the trend is moving (Ex: left to right vs. right to left). Often times, the harder questions will ask you to go backwards, so, for example, you may have to work from right to left following a trend instead of the easier left to right.

Graphs with multiple axes are not too challenging, but you do need to look out for them. Most often, you will see graphs that have 2 different values being graphed on the y-axis. As always, read the questions carefully and pay close attention to the units to know whether you are using the values on the left or right side.

Multiples Axis & Inverse Trends Practice Questions:

A flying squirrel flies by stretching out its legs, exposing a thin membrane that spreads out so it can glide through the air. The chart below shows the relationship between the speed of a flying squirrel and the percentage of its wing membrane exposed during a flight.

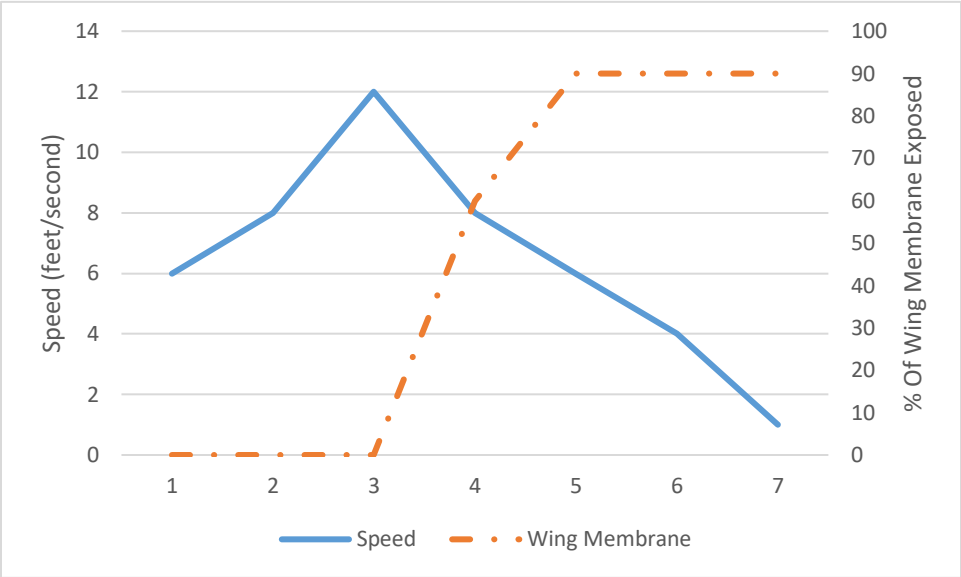


Figure 1

1. According to Figure 1, what percent of the wing membrane was exposed at 4 seconds?
   A. 4 %
   B. 8 %
   C. 40 %
   D. 60 %

2. Which of the following statements best describes what happened to the speed of the flying squirrel from 3 to 5 seconds?
   A. Increased, because the percent of the wing membrane exposed increased
   B. Increased, because the percent of the wing membrane exposed decreased
   C. Decreased, because the percent of the wing membrane exposed increased
   D. Decreased, because the percent of the wing membrane exposed decreased

3. As the speed of the flying squirrel decreases, what happens to the percentage of wing membrane exposed?
   A. Increases only
   B. Decreases only
   C. Remains constant and then decreases
   D. Increases and then remain constant

Experiment 1

20 mg of Bacteria 1 and Bacteria 2 were placed on to two different agar plates and then monitored for growth after 24 hours in 5 different temperatures.

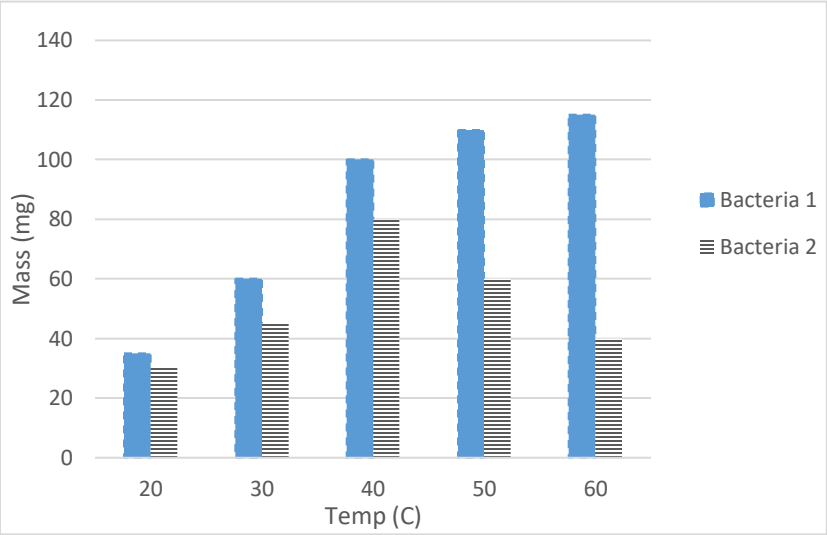


Figure 1

4. As the temperature in the Experiment is decreased from 60°C to 40°C, how do the mass of Bacteria 1 and Bacteria 2 change?

	Bacteria 1	Bacteria 2
A.	Increase only	Increase only
B.	Increase only	Decrease only
C.	Decrease only	Increase only
D.	Decrease only	Decrease only

5. If 10 mg of Bacteria 1 had been placed on agar plates and the procedure in Experiment 1 was repeated, how much would Bacteria 1 weigh in a 40 °C environment?
   A. 40 mg
   B. 50 mg
   C. 80 mg
   D. 100 mg

6. If 20 mg of Bacteria 2 had been placed in a 10° C environment, how much would the bacteria most likely weigh after 24 hours?
   A. Less than 30 mg
   B. Between 30mg and 40 mg
   C. Between 40 mg and 50 mg
   D. Greater than 50 mg

Math on the Science Test

As odd as it seems, on the Science Test there are some questions that require basic math. For these questions, you will not need to find a specific number, but instead you need to be able to effectively estimate and approximate.

Since you do not have the calculator in this section, it is usually easiest to round any data points to easier numbers that you can then calculate in your head or with some simple algebra on the paper.

Table 1

Time for experiment completion (minutes)	252

1. Based on Table 1, approximately how many hours did it take to complete the experiment?
   A. 2
   B. 3
   C. 4
   D. 6

Whenever you are dealing with large numbers on the science section cutting off the last digits can often make your life easier.

$$\frac{252}{60} \longrightarrow \frac{25}{6} \longrightarrow 4$$

Now, try to estimate the following. Do not try to find the exact number instead just try to get close.

What is 10% of 84?

How many hours are in 1 week?

How many dozens are in 130?

You are driving 28mph. How long does it take you to complete a 180-mile road trip?

If 1 mole of a substance weighs 26g, how much, in grams, do 11 moles of the same substance weigh?

A bead weights 20.5g. A bowl weights 1000g. A bowl filled with an unknown number of beads weights 1.4kg. How many beads are in the bowl?

Science Knowledge & Experimental Thinking Questions

On the Science Test, some questions will ask you to apply basic science knowledge or experimental thinking. For these questions, the answers will not be anywhere in the passage. Instead, you will have to use your own knowledge. If you are not a science fan, do not worry! The scientific knowledge questions just rely on basic science knowledge, and experimental thinking questions simply ask you to think about the experiment like a scientist.

1) Water

The ACT Science Test loves to ask you about water. These questions can appear as both scientific knowledge questions and experimental thinking questions. Below are some of the basic water facts that you should know:

Boiling Point of H_2O = 100°C
Freezing Point of H_2O = 0°C
Evaporation: Liquid to Gas
Condensation: Gas to Liquid

The majority of the water questions focus on an experimental step that relates to water. Usually, these questions will not require you to look at a chart or graph.

Water practice questions:

1. The wet soil mixture was oven-dried before the experiment was conducted. What is the most likely reason for doing so?
   A. Remove fertilizers
   B. Remove moisture
   C. Increase the mass
   D. Reduce the force

2. An experiment is conducted to test the volume of runoff water from a 10kg pile of snow. If the experiment was repeated at -5^{o}C, what would most likely happen to the volume of runoff water collected?
   A. Increased, because the melting point of water is above -5°C
   B. Increased, because the melting point of water is below -5°C
   C. Decreased, because the melting point of water is above -5°C
   D. Decreased, because the melting point of water is below -5°C

2) Experimental Setup

Other questions will ask you to identify the "most likely" reason that a certain setup or step was taken in the experiment. **When you see the term "most likely" in the question, the answer is usually not going to be in the Passage; instead, you will need to rely on your own outside science knowledge.** To answer these questions, just think like a scientist and pick the answer that makes the most logical sense.

Experimental Setup Practice Questions:

5 different types of plants were grown in the same one-acre plot and treated with the same fertilizer. Since the experiment was setup outdoors in a rainy climate, the plants were never watered. After one month, results were recorded to see which type of plants grew the best.

1. The reason that all of the plants in the experiment were grown in the same acre plot was most likely
    A. To be exposed to different environments
    B. To receive the same amount of rain
    C. To increase cross pollination
    D. To increase their growth rates

Scientists planted 3 different species of fungi in three different pots filled with moist soil. The 3 species of fungi were then placed into 3 separate round, sealed glass terrariums. The terrariums were all placed outside at the same location and then left for two months. After two months, the fungus growth was recorded.

2. What is the most likely reason the terrariums were placed outside?
    A. To receive the same soil quality
    B. To receive the same amount of rain
    C. To be the same temperature
    D. To receive the same nutrients

3) Other Outside Knowledge

Beyond the water and experimental setup questions, the ACT may ask you to use a variety of other outside science knowledge. Below is a cheat sheet that lists many of the common topics that have appear on past ACTs.

Genetics:

- Dominant alleles: Capital letters (T)
- Recessive alleles: Lowercase letters (t)
- Heterozygous: two different alleles (Tt)
- Homozygous: Two same alleles (TT)

Punnet Square (TT x Tt)

	T	T
T	TT	TT
t	Tt	Tt

Biology:

Gametes: sex cells, which hold half of the chromosomes

ATP: primary source of energy, produced by mitochondria

Amino acids: building blocks of protein, contain nitrogen

Starch: sugars

Gene: a combination of related alleles

Alleles: the individual pieces of a gene

Endothermic: warm-blooded

Ectothermic: cold-blooded

Vertebrates: organisms with back-bones

Invertebrates: organisms that do not have backbones

Hierarchical ranking: Family -> Genus -> species

Chemistry:

Freezing point of water = 0° C
Boiling point of water = 100° C

1 Mole = 6.022×10^{23}

Protons: charge of +1, located in the nucleus, mass of 1 atomic mass unit (AMU)

Neutron: no charge and exist in the nucleus, same mass as protons (1 AMU)

Electron: charge of -1, located outside the nucleus, no mass (0 AMU)

Solubility: The property of a solute to dissolve in a solvent ex. Salt in water

Radiation: energy leaves an object through a material medium

Convection: energy leaves an object via circulation in fluids

Conduction: energy leaves an object via direct contact with another object

Acid Base Scale: less than 7 is acidic and greater than 7 is basic

Physics:

Momentum: The quantity of motion of a moving body, found by multiplying mass x velocity.

Potential energy: Energy at rest. This is typically higher at higher heights and lower at lower heights. ($PE = mgh$ where m = mass, g = gravity, and h = height)

Kinetic energy: Energy in motion. There is typically more kinetic energy at higher speeds and lower heights. ($KE = \frac{1}{2}mv^2$ where m = mass and v = velocity)

Total mechanical energy: the sum of potential and kinetic energy of an object

Velocity equation: $distance = velocity\ x\ time$

Forces: gravity pulls down toward earth and friction is the opposite of the direction of the motion

Positive and negative signs signal direction, not magnitude (-5m/s is faster than 3m/s)

Charges: like charges and poles repel, unlike charges and poles attract.

Practice Passages

Remember, for most questions on the ACT, you do not need to rely on any information from the text or use any previous knowledge. Most questions can be answers by simply using the charts and graphs. Be sure to pay close attention to axes, keys, and units when you are working with graphs.

To practice this, we will use the charts and graphs below. There is very little text to introduce this passage, so you will need to rely on the information in the charts and graphs to answer the questions correctly.

Passage 1

Scientists setup an experiment to track how chemical runoff from four separate manufacturing plants (A, B, and C) affect the plant life in lakes next to each plant.

Figure 1

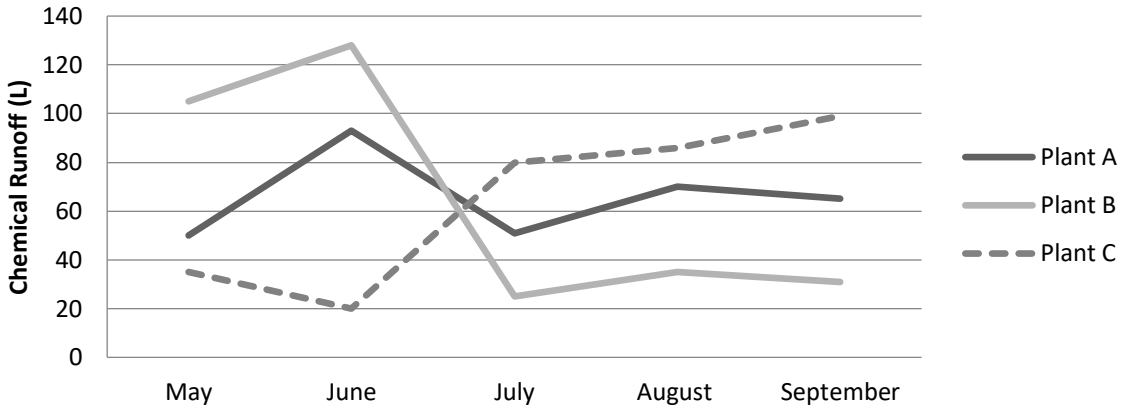
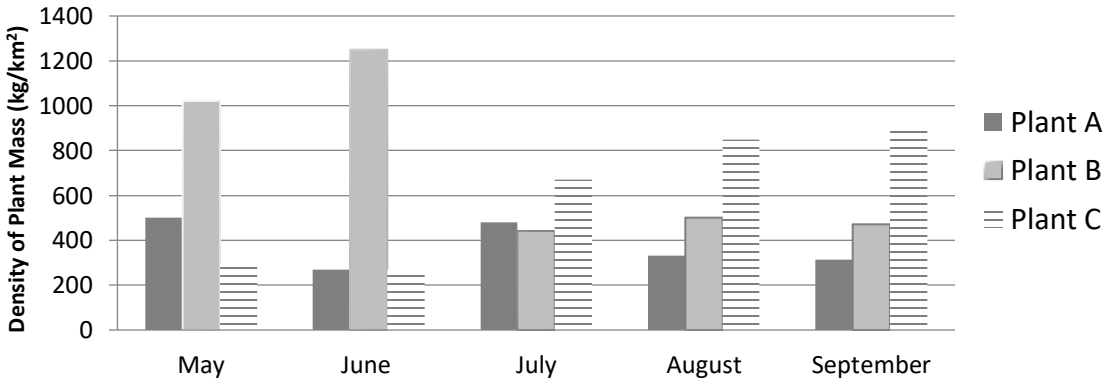


Figure 2



1. According to figures 1 and 2, what was the chemical runoff and density of plant mass for Plant B in August?

	Chemical Runoff	Density of Plant Mass
A.	70L	850 kg/m^2
B.	35L	1250 kg/m^2
C.	35L	500 kg/m^2
D.	25L	500 kg/m^2

2. According to Figure 2, as the year progressed, the amount of plant mass in the lake near plant A:
   A. decreased only
   B. increased only
   C. both increased and decreased
   D. remained constant

3. If the scientists went back in October and measured the amount of chemical runoff for plant C, it most likely would be:
   A. less than 35L
   B. between 35L and 65L
   C. between 65L and 100L
   D. greater than 100L

4. According to Figures 1 and 2, which of the manufacturing plants showed a consistent increase in the density of plant mass as the amount of chemical runoff increased?
   A. Plant A
   B. Plant B
   C. Plants B and C
   D. Plant A, B, and C

5. Before the experiment began, one of the scientists hypothesized that as the chemical runoff increased, the amount of plant mass in the lake at Plants A would decrease. Does this experiment support his hypothesis?
   A. Yes, because the density of plant mass in lake A decreases from May to June.
   B. Yes, because the density of plant mass increases for plant A from July to September.
   C. No, because the density of plant mass in lake A decreases from May to June.
   D. No, because the density of plant mass increases for plant A from July to September.

6. One of the scientists noticed that at Plant C from June to September the density of plant mass increased as the volume of chemical runoff increased. Which of the following best explains this?
   A. Lake C has fewer fish than any of the other lakes.
   B. The runoff from Plant C contains nutrients that help the plants grow.
   C. There is much stronger sunlight during the months from June to September.
   D. Floods in June washed new plants from the nearby streams into the lake.

Passage 2

Scientists investigated the effect of temperature on the eggs of three species of birds: T. migratorius, C. cardinalis, C. cristata. T. migratorius populations are stable, but C. cardinalis and C. cristata populations are declining.

Experiment 1

500 newly laid eggs of the T. migratorius, C. cardinalis, and C. cristata were collected from nests. Next, half of the eggs were placed in a net enclosure that was placed in direct sunlight. The other half of the eggs were placed in an enclosure that was placed in the shade. The enclosures were monitored until all of the eggs had either hatched or died. The percent of total eggs hatches for each species and type of enclosure is show in Figure 1.

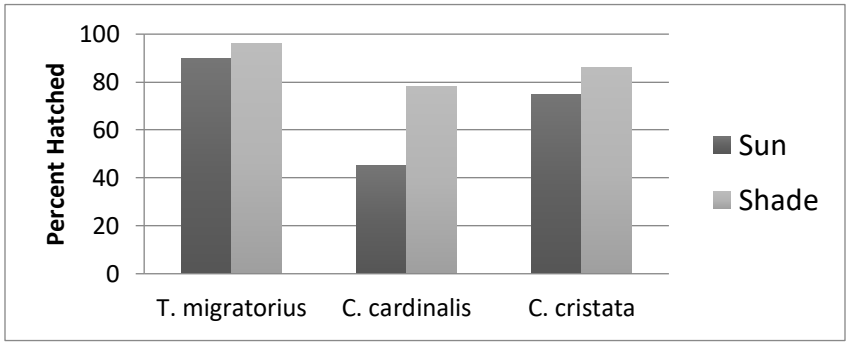


Figure 1

Experiment 2

Additional C. cardinalis eggs were collected and divided into 5 groups (Groups 1-5), each containing 20 eggs. These were taken to the lab and kept in a controlled incubator with a controlled temperature until the eggs hatched or died. Each group was kept at a different temperature (Table 1). The percent of eggs that were surviving in each group were recorded each day for 10 days.

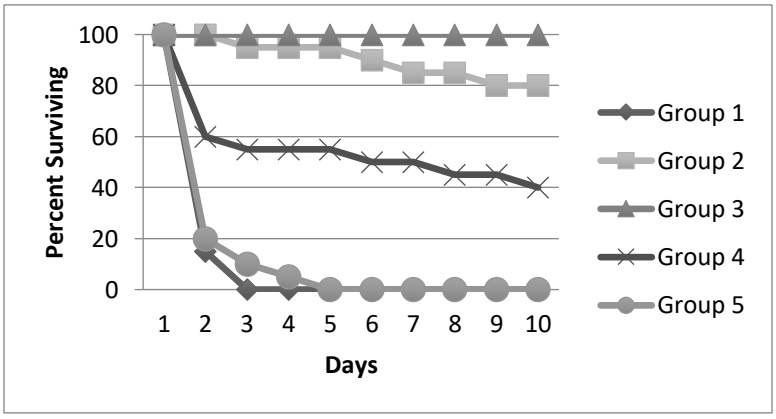


Figure 2

Table 1	
Group	Temperature (°F)
1	50
2	60
3	70
4	80
5	90

1. According to Experiment 2, if a new group of eggs were incubated at 65 °F, the percent surviving after 8 days would most likely be:
   A. less than 10%
   B. between 10% and 45%
   C. between 45% and 80%
   D. greater than 85%

2. According to the results of Experiment 1, eggs of which species of bird suffered less than 20% mortality when placed in the sun?
   A. T. migratorius only
   B. C. cardinalis only
   C. T. migratorius and C. cristata only
   D. C. cardinalis and C. cristata only

3. A recent study showed that C. cardinalis birds build most of their nests in the sun. Does this information help explain why the C. cardinalis populations are in decline?

   A. Yes, because less than 50% of the C. cardinalis eggs in the sun hatched.
   B. Yes, because over 75% of the C. cardinalis eggs in the sun hatched.
   C. No, because less than 50% of the C. cardinalis eggs in the sun hatched.
   D. No, because over 75% of the C. cardinalis eggs in the sun hatched.

4. Based on the results of Experiments 1 and 2, which of the following were most likely the temperatures of the C. cardinalis eggs that were placed in the sun and in the shade?

	Sun	Shade
A.	90°	70°
B.	70°	60°
C.	60°	50°
D.	80°	60°

5. The incubators used in experiment 2 are electronic incubators that can be set to an exact temperature within 1 °F. The researchers also placed a thermometer at the back of each incubator. What is the most likely reason for that?
   A. To confirm that the incubators were actually at the correct temperature.
   B. To make sure the temperature at the back of the incubator was the same as at the front.
   C. To record the room temperature outside of the incubator.
   D. To track how the sun affects the air temperature in the incubator.

6. A scientist suggested that the decline in some bird populations is caused by thinner eggshells that allow more UV rays to reach the baby inside. He further suggested that birds with steady populations have thicker eggshells that protect the baby inside from UV rays. In addition to the information in Experiment 1, which piece of information would best support this scientist's hypothesis?

   A. All three birds in this study have thin eggshells.
   B. T. migratorius build almost all of their nests in the shade.
   C. T. migratorius and C. cristae have thick eggshells but C. cardinalis have thin eggshells.
   D. Predators prefer to eat eggs with thick eggshells.

Conflicting Viewpoints Practice Passage

Remember, for the conflicting viewpoints passage, you must read the entire passage before answering the questions. As you read, it is a good idea to underline the key differences between each viewpoint. This will help you save time as you answer the questions.

Passage 1

Mrs. Brocktree's physics class is going to be conducting an experiment about the free fall of objects. Mrs. Brocktree tells the students that they will be dropping two different objects from the balcony of the building: a basketball and a magazine. They conduct the experiment when no wind is present, so the earth's gravity will be the only force causing them to accelerate. Mrs. Brocktree then asked three students to hypothesize whether the basketball or the magazine will hit the ground first.

The force of gravity is defined by F=9.8 m/s2

Student 1: Since the basketball is heavier than the magazine, it will begin to fall faster than the magazine. Both objects will reach the same maximum speed due to the force of gravity, but the basketball will reach the maximum speed faster than the magazine. Therefore, the basketball will move at a faster average speed than the magazine and reach the ground before the magazine does.

Student 2: Even though the basketball is heavier than the magazine, both objects will accelerate at the same rate due to the force of gravity. Further, both objects will reach the same maximum speed as well as the aerodynamics of the objects does not matter. Therefore, the basketball and the magazine will both reach the ground at the same time.

Student 3: The difference in weight between the two objects will not affect the acceleration as the force of gravity is the only thing causing them to accelerate. Therefore, both objects will reach the same maximum speed. However, the magazine is less aerodynamic than the basketball, so it will reach its maximum speed after the basketball does. As a result, the basketball will have a faster average speed and will hit the ground first.

1. Which students agree that the weight of an object does not affect the speed at which it will fall?

   A. Students 1 and 3
   B. Students 1 and 2
   C. Students 2 and 3
   D. Students 1, 2, and 3

2. Which of the students agree that the weight of the object affects the acceleration?

   F. Student 1
   G. Students 1 and 3
   H. Students 2 and 3
   J. None of the students

3. According to student 2, if the force of gravity on Mars is greater than that on earth will the objects fall faster or slower?

   A. Faster, because the basketball will be heavier
   B. Faster, because the basketball will be lighter
   C. Slower, because the basketball will be heavier
   D. Slower, because the basketball will be lighter?

4. Based on student 1's opinion, as the acceleration of a falling object increases, will it reach the ground faster or slower?
   E. Faster, because it will increase the average speed.
   G. Faster, because it will decrease the average speed.
   H. Slower, because it will increase the average speed.
   I. Slower, because it will decrease the average speed.

5. If a bowling ball was also dropped, according to student 3 which object would land first?
   A. The magazine
   B. The bowling ball
   C. The basketball
   D. The basketball and the bowling ball at the same time

6. If the experiment was conducted a second time but there was a steady wind, what would be the largest change?
   F. The gravitational force on the bowling ball.
   G. The gravitational force on the magazine.
   H. The force of air resistance on the bowling ball.
   J. The force of air resistance on the magazine.