1.7 The Elusive A in Math

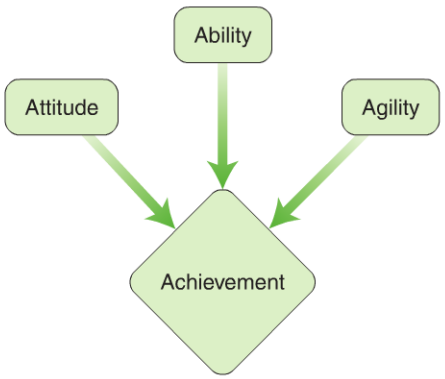
Explore

1. For each statement given below about math classes, mark an X in the appropriate box. Be honest in your responses. There are no right or wrong answers.

Statement	Agree	Disagree
a. Math class should have a teacher explaining the material for all new concepts.		
b. I shouldn't be struggling with content. If I am, it means there is a problem.		
c. Solving a problem means finding the right equation, plugging in numbers, and calculating a result.		
d. If I am given a problem, I should know how to solve it.		
e. If I am supposed to know the answer, it shouldn't take very long and I shouldn't have to think about it.		
f. If the teacher sees we are clearly having trouble, it's his/her job to tell us how to solve the problem.		
g. Drawing a picture is not a good use of time. It does not make a difference.		
h. I should be able to do everything in my head.		
i. People are either good at math or they're not. There is no way to change which group you fall into.		
j. Math problems have one right solution that just has to be found.		
k. I have used something I learned in a math class at a job.		
l. I have needed to solve a math problem in my life, but it was not the type I learned in school.		
m. If I cannot use a math procedure immediately in my personal or work life, then I do not need it.		
n. I think that it doesn't matter how you work a problem as long as you get the correct answer.		
o. If you are not making mistakes, you are not working on hard enough problems.		

Discover

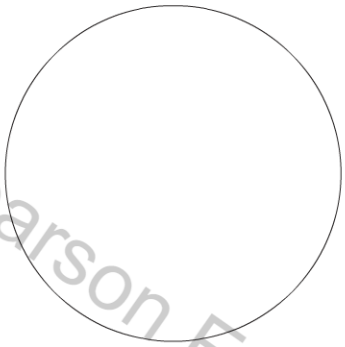
Many students want to get an A in a college math class but find that to be more difficult to achieve than they expected. So, what does it take to earn an A? The relationship between achievement and the personal characteristics necessary for it are shown below.



The three personal characteristics that factor into the achievement of success in a math class can be defined as follows:

Attitude	Your beliefs about yourself and your abilities; your approach to situations; the amount of effort you put forth
Ability	What you can do; your skills; your knowledge
Agility	How fast or easily you can do something; how you apply knowledge

2. Draw a pie graph that shows the relative importance you place on each of these three characteristics as they contribute to success. This will be a rough approximation.



3. This is a statement college math professors hear repeatedly from their students:

"I can do the work at home and on MyMathLab. I thought I knew it. But when I took the test, I couldn't do it. I don't know what I should do because I definitely studied."

a. What are these students lacking that is causing them to not be successful in mathematics?

b. What should they be doing during their study time to adequately prepare for a math test?

4. Each of the following actions or descriptions demonstrates **one** of the personal characteristics (attitude, ability, agility). Talk with your group members to identify each action's category and then highlight it in the appropriate color or denote it with the indicated abbreviation.

Attitude.....yellow or AT
Ability.....blue or AB
Agility.....green or AG

a. attends every class

b. completes all assignments

c. asks questions when confused

d. is willing to learn about a new context

e. knows when and how to do a calculation on a calculator

f. is not overly dependent on a calculator

g. is responsible for completing work on time

h. remembers skills from past courses

i. does not give up easily when frustrated

j. works cooperatively with other students and the instructor

k. recognizes the opportunity to apply a skill to a new situation

l. can do a calculation or procedure (make a graph, solve an equation, etc.) accurately

m. has an appropriate level of confidence

n. applies knowledge from past experiences

o. makes connections between topics

p. estimates results before performing calculations

q. checks answer for reasonableness

r. writes meaningful answers with units

s. reads critically and completely

t. can explain a process to a friend

5. Complete the following chart *without using a calculator*:

	Number of Characteristics	Percent of Total
Attitude		
Ability		
Agility		
	20	100%

A pie graph is an excellent way to visualize **a comparison of part and whole**. In this scenario, the whole is achievement. At the beginning of the lesson, we made a rough estimate of the portion that attitude, ability, and agility each contribute. With the above information, we can make a more precise pie graph depicting percentages and their areas.

STICKY note

The fractions in the table are easy to change to percents without a calculator. Create an equivalent fraction by multiplying or dividing the numerator and denominator by the same number as needed. We refer to this process as **scaling** a fraction. We will use it often.

$$\frac{3}{10} \overset{\times 10}{=} \frac{30}{100}$$

How it works

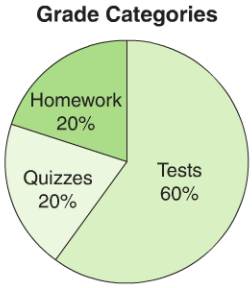
To create a pie graph:

Determine the percentage for each category. The percentages should total to 100.

1. To determine the size of each **sector** in the pie, you need to find the measure of its **central angle.** Take the sector's percent and multiply it by 360 degrees.
2. Draw each sector of the pie graph using the central angles as guides. For more precision, use a protractor or Excel for this step.
3. Label each sector with a name and percentage. Label the graph with a title.

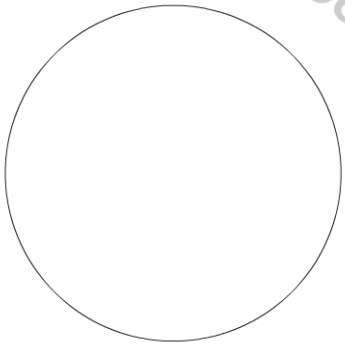
For example, an instructor uses the following grading structure.

Grade Category	Percent	Sector Degrees
Tests	60	0.60(360) = 216
Quizzes	20	0.20(360) = 72
Homework	20	0.20(360) = 72



Note: A pie graph can only be used when the categories do not overlap and encompass the whole.

6. Use your results to draw a pie graph that illustrates how attitude, ability, and agility contribute to achievement. Shade sectors using appropriate colors (yellow, blue, green) on paper for easier reading. Compare this pie graph with the one you created before calculating any percentages.



Another way to visualize data is a bar graph. The bars can be horizontal or vertical. Bar graphs are a useful tool for making **part-to-part comparisons**.

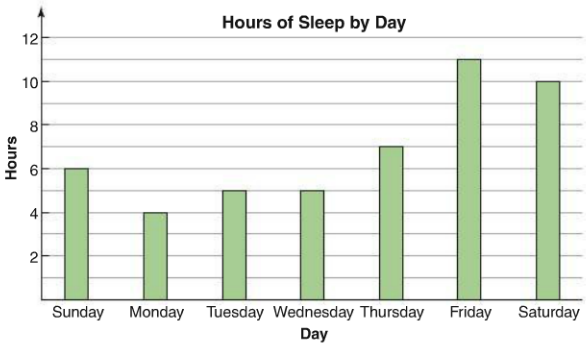
How it works

To create a vertical bar graph:

1. Determine the categories that will be graphed and the values to be graphed for each category.
2. Draw and label axes.
3. On the horizontal axis, draw a small dash known as a tick mark for each category. Write the name of the category under each tick mark.
4. Look at the values for the categories to be graphed. Mark tick marks on the vertical axis using equal increments.
5. Draw vertical bars centered over the category tick marks on the horizontal axis. Use the tick marks on the vertical axis and the category values to determine the height of each bar.
6. Label the graph with a title.

For example, we can use a bar graph to compare the hours of sleep a student gets each night of a week. The data is given below. Based on the categories (in this example, days) and their values (from 4 to 11), we choose tick marks spaced every 2 hours from 0 hours to 12 hours.

Sunday	6
Monday	4
Tuesday	5
Wednesday	5
Thursday	7
Friday	11
Saturday	10



The process to make a horizontal bar graph is similar to the process presented in *How It Works*, but the axes are switched. Labels appear on the vertical axis; numbers for the length of the bars appear on the horizontal axis. An example of a horizontal bar graph appears in the *Skills* problems in the homework.

7. a. Use your results from problem #5 to draw a bar graph that illustrates how attitude, ability, and agility contribute to achievement.

b. What does a bar graph show visually that is different from what a pie graph shows?

So far we have talked about how a student has to think to be successful in mathematics. Now we will look at how a student needs to work.

Consider this definition:

Achievement	An accomplishment based on work and/or talents

8. How important is work ethic, compared to natural talent, in a math class? Do you think the brightest student can do well in a math class without working? Do you think a student can overcome a lack of background or ability with hard work?

STICKY note

If you cannot meet someone's expectations, don't give excuses. A good rule of thumb is to tell the person *when* something will be completed, not just *why* it wasn't completed. Usually, the person on the other end is much more concerned with the *when* than the *why*.

Another important facet to success in college is understanding the role of responsibility. It is not enough to have talents or even to work hard. Work must also be done on time and as instructed by your professors. Students often struggle with this idea and will blame technology issues (Internet going down, printer running out of ink) and other circumstances in their lives when they are unable to complete a task on time. Instructors vary in terms of what they will accommodate, and many will not tolerate late work for any reason. This is a tough rule, but a valuable one.

Reflect

WRAP-UP

What's the point?

Pie graphs and bar graphs are two ways to visualize data. We used them to look at the roles three personal characteristics play in mathematical success.

What did you learn?

How to create and interpret pie and bar graphs
The necessary components to succeed in mathematics

Cycle 1 Question: What can be learned?

List at least four traits necessary to be successful in math.

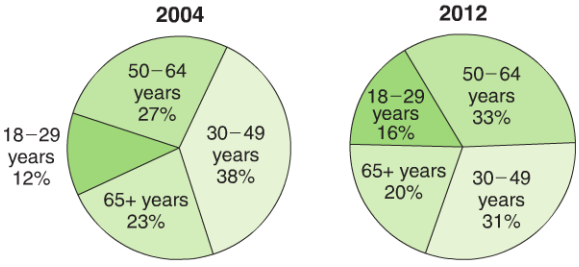
1.7 Homework

Skills

MyMathLab

- Create and interpret pie and bar graphs.

1. The following pie graphs show demographic information about ages of likely presidential voters in a particular state in 2004 and 2012.

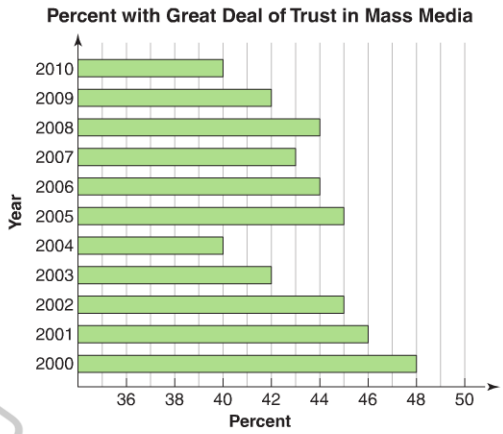


a. By how many percentage points did the 18–29 years category increase?

b. Which category showed the largest percentage-point change?

c. What is the measure of the central angle of the 50–64 years category in the 2004 pie graph? Round to the nearest degree.

2. The bar graph shows the percentage of adults in the United States who say that they have a great deal of trust in the mass media.



a. In which year(s) did the percent increase from the previous year?

b. If there were 950 people in the survey, how many of them expressed a great deal of trust in the mass media in 2000?

Concepts and Applications

- Create and interpret pie and bar graphs.
- Understand the necessary components to succeed in mathematics.

3. Often, students will earn 100% on MyMathLab homework but not on quizzes or tests. Which of the three characteristics are they lacking?

4. For each scenario given, identify the student's area of weakness (attitude, ability, agility). Describe what each student should do or should have done to resolve the problem.

a. Naomi understands all the topics being taught in class now but is very slow to solve problems that require information or procedures from a previous course. The instructor says she will not reteach prerequisite material.

b. Tim can do problems in the homework, but if a new problem looks different from something he's already seen, he gets stuck.

c. Marla almost placed into a higher math course, so she is sure that she already knows what's going on in the class. Attending class is a waste of time. As the semester progresses, her grades consistently fall. By the end of the semester, she is scrambling to earn enough points to pass.

5. There are many specific tasks you can do to improve your chances of success in a math class. Read the suggestions below and circle the task(s) you will use in this course.

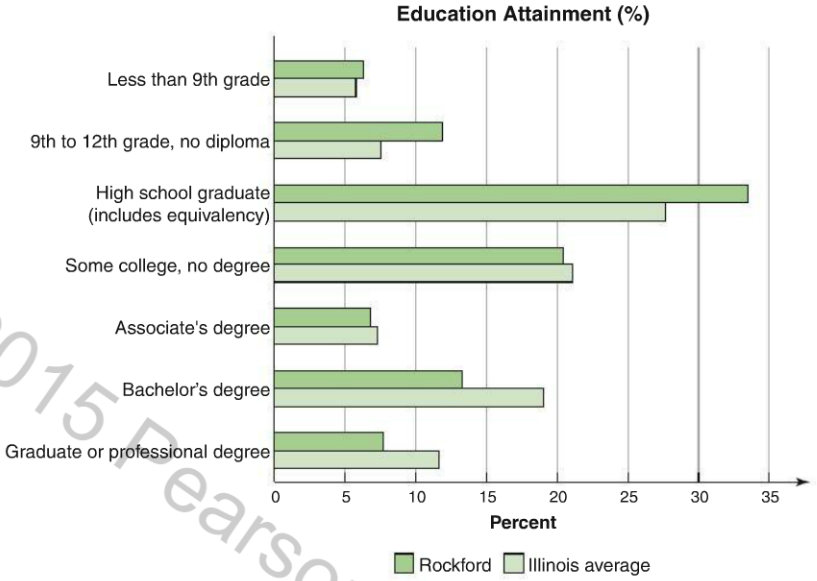
1. Attend all classes.
2. Work two hours outside of class for every one hour inside class.
3. Participate and ask questions.
4. Put a star by any problems done in class that didn't make sense at the time.
5. Before attempting homework problems, reread notes from that day's class. Highlight terms.
6. Go through each starred problem until it makes sense.
7. Seek help from your instructor if needed.
8. Do any assigned homework.

MyMathLab:	Work problems on paper.
	Use *Help Me Solve This*, not *View an Example*.
	Complete the *Skills* problems.
Homework in the worktext:	Work each problem.
	Check answers.
	Continue working with any missed problem until you can get the correct answer.

9. Prepare for the test using the 5-step plan at the end of the cycle.
10. Rework any missed test questions and seek help if needed.

6. Pie graphs are most useful for _____ comparisons, while bar graphs are most useful for _____ comparisons.

7. Consider the following graph, which shows the educational attainment of residents of Rockford compared to the Illinois average in a recent year.



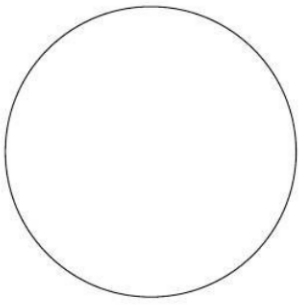
Source: census.gov

a. For which educational levels does Rockford exceed the state average?

b. What is the most common educational level in the town?

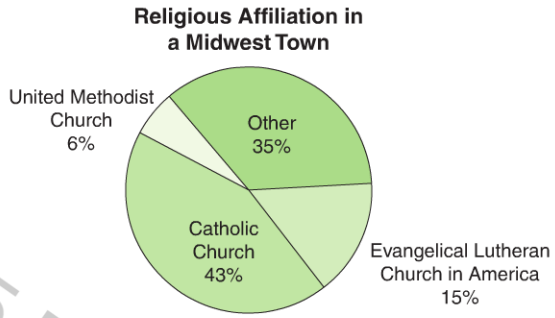
c. Do the percents for Rockford total to 100 percent? Are there categories of educational achievement that have not been included on the graph?

d. Represent the percent of Rockford residents with various education levels using a pie graph.



e. Which graph (bar or pie) do you think best represents the percent of Rockford residents with various education levels? Justify your choice.

8. Consider the following pie graph, which shows the religious affiliation for residents of a Midwest town in a recent year.



a. What category seems to be missing from this graph?

b. Do the percents in the pie graph total 100%? If not, give a possible reason.

c. The pie graph actually represents only the 50% of residents who claim a religious affiliation. If the population of the town at the time the graph was made was 156,300 people, then how many people claimed some religious affiliation? How many claimed to be Catholic?

d. Estimate the central angle for the largest sector of the pie graph. Then use the percent for that category to calculate the central angle more accurately. How close was your estimate?

e. Represent the information in the graph with a bar graph.