

MIDDLE SCHOOL | UNIT 2

Getting Paid

Title

Learn More, Earn More?

LEARNING OBJECTIVES

Students will:

- **analyze** bar graphs.
- **draw conclusions** using information from a graph.
- **explain** how graphs showing different information can be helpful for the reader.

Content Area

Math

Grades

6–8

Overview

Will getting more education guarantee that you will earn more money? Students view and interpret three graphs relating to earnings and educational attainment. The activity begins with students guessing the cost of college and considering why people invest in higher education. Students then analyze data in three different graphs with information about median earnings by education level, occupation, and college major. Students make comparisons and draw conclusions. In doing so, they learn that information on graphs may appear straightforward, but it is important to dig deeper and ask questions.

Themes

Personal Finance: Earning Potential; Investing in Higher Education

Math: Data Analysis

Common Core Math Standards

MP1: Make sense of problems and persevere in solving them.

MP2: Reason abstractly and quantitatively.

MP3: Construct viable arguments and critique the reasoning of others.

MP4: Model with mathematics.

7.SP.A.1: Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a

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population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

8.F.B.5: Describe qualitatively the functional relationship between two quantities by analyzing a graph.

8.EE.B.5: Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

6.SPA.3: Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Connect

How does this connect to the student?

Deciding whether or not to pursue further education is a decision many students will face. Their decisions should be based on a thorough understanding of the potential benefits and tradeoffs involved. While there are generalizations that can be made about more education leading to higher incomes, this is not true in every profession. Students should do research before making a decision.

How does this connect to careers?

School Counselor: Most schools employ counselors that, among other things, help students to prepare for their futures. They can help students consider their career and education options and point students and their families in the direction of additional information and resources.

How does this connect to the world?

In the United States, students generally pay at least a percentage of their college costs. This isn't true in every country. For example, Germany, Norway, and Spain offer free college to any student that qualifies. There have been calls for free higher education in the United States, but these are often met with concerns about how to pay for this proposal.

Key Terms

Personal Finance: income, earnings, college, bachelor's degree

Math: bar graph, median, mean, percentile

Prepare

Background: Graphs can be useful in helping to understand complex topics. They can present a large amount of information that can be analyzed and used to make decisions. In this activity, students will review graphs based on two studies from Georgetown University's Center on Education and the Workforce. The first study, [The College Payoff](#), was published in 2011 and provides comprehensive and easy-to-understand information on how lifetime earnings vary by educational attainment level, including the general claim that "a Bachelor's degree is worth \$2.8 million on average over a lifetime." In addition to these averages, the report goes into more detail, showing how earning estimates can vary tremendously from one occupation to another. In 2015, some of the same Georgetown University researchers produced a new report, [The Economic Value of](#)

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[College Majors](#). This newer report compares the value over a lifetime of specific college majors and finds that “the top-paying college majors earn \$3.4 million more than the lowest-paying majors over a lifetime.” It also provides information on the college majors with both the highest and lowest earnings expectations.

In this activity, students will analyze and compare data from these two studies to form conclusions about higher education and earnings. It is important for students to realize that while averages are helpful, there is often more nuance in data than might first meet the eye. Students should also be reminded that job outlooks and earnings can vary over time. The information provided in this activity is intended to help them understand the importance of doing research. It is not intended to be definitive or guide their career choice.

Materials

- **Median Lifetime Earnings Student Handout**—one copy per student
- **Earnings by Education and Occupation Student Handout**—one copy per student or displayed electronically
- **Wages by College Major Student Handout**—one copy per student or displayed electronically
- **What Do You Want To Be When You Grow Up? Unit 2 Student Video**

Engage

- Inform students that you will be doing an activity about college education and how much people can expect to earn if they get a college degree. To warm up, ask students if they think they know how much it costs to go to college. Give them parameters such as the national average for private colleges and have them guess the amount (\$32,410 per year¹), or select a well known or nearby college or university with which students might be familiar or interested. Allow students to guess and give hints, such as higher or lower, until students get the answer.
- Once the students have the correct answer, remind them that most **bachelor’s degrees** take four years to complete. Invite students to calculate the cost of four years.
- Ask students if they think paying for additional higher education is worth the cost. Why do so many people go to college when it costs so much?
- Play the video **What Do You Want To Be When You Grow Up?** Ask students to share any new insight into why people pay for college.

Teach

- Divide students into pairs or small groups. Distribute a copy of **Median Lifetime Earnings Student Handout** to each student. Ask students what type of graph is shown?
 - Answer: bar graph
- Request that a volunteer locate and read the title of the graph, *Median Lifetime Earnings by Highest Educational Attainment*. In their pairs or small groups, invite students to discuss what the graph is showing and share their thoughts with the class.
 - Anticipated Response: how much people will earn over the course of a lifetime depending on how much education they obtain
- Make sure students noted that the graph refers to **median** earnings. Remind students that the median is the middle

¹<https://bigfuture.collegeboard.org/pay-for-college/college-costs/college-costs-faqs>

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value when the amounts are ordered from least to greatest. Discuss why the researchers might have decided to use the median earnings rather than the *mean* or average.

- Answer: using an average could skew the results because of potential outliers in the data
- Direct students to make notes on the graph showing the total number of years people can expect to be in school at each educational attainment level (beginning with Kindergarten). Provide the answers, or ask students to estimate and then correct, as needed.
 - Answers: Less than High School <13; High School Diploma 13; Some College/No Degree 14–17; Associate’s Degree 15; Bachelor’s Degree 17; Master’s Degree 18–20; Doctoral Degree 20–24; Professional Degree 19–21
- In their pairs or small groups, direct students to answer the questions below the graph. Compare and discuss student answers.
- Challenge students to consider what conclusions they can draw from the graph. Ask students if this is enough information to convince them to go to college. If not, what other information would they need?
 - Answer: the more education a person receives, the more they are likely to earn over the course of a lifetime.
- Distribute one copy of the **Earnings by Education and Occupation Student Handout** to each student or display electronically. Give students time to analyze the graph, and discuss what new information is provided in this graph. Does this graph change their mind about pursuing higher education? Why or why not?
- Ask students if all people with high school degrees earn less than people with a bachelor’s degree.
 - Answer: No—for example, a person with a high school diploma working in a STEM field can expect to earn more than a person with any education level working in health support, personal services, or blue collar jobs.
- Remind students that data and charts can sometimes be deceiving. If you only had the information in the first graph, you might make different decisions than someone that also had the information in the second graph.
- Let students know that many jobs require people to have a bachelor’s degree. Ask students to name some jobs that they think might require people to have at least a bachelor’s or 4-year degree.
 - Anticipated responses: teacher, architect, doctor, lawyer
- Explain to students that when you go to college, you choose a major that is related to the job or career you hope to have in the future.
- Distribute one copy of **Wages by College Major Student Handout** to each student or display electronically.
- In their small groups, invite students to discuss the graph and the information shown. Prompt students to make sure they understand what is meant by 25th *percentile*, median (50th percentile), and 75th percentile. It might help to compare this graph to one students may have seen at a doctor’s visit. If, for example, a person’s height is said to be in the 25th percentile, this means that about 25% of people are shorter than the person and 75% are taller. Or, put another way, there is 25% change that another person will be shorter than that person and a 75% chance someone will be taller. The same is true for the earnings shown on the graph. As noted in the [full report](#), “workers with Bachelor’s degrees in architecture and engineering have a 75 percent chance of earning at least \$59,000; 50 percent chance of earning at least \$83,000; and a 25 percent chance of earning at least \$113,000.”
- Facilitate a discussion about the information presented in the graph. How does showing more than just the median provide additional value to the reader? Why does the graph also include information for high school graduates? Is it helpful that the values for all majors are shown?

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Conclude

- Inform students that one of the major conclusions of [The Economic Value of College Majors](#) report is this: “Majors play a larger role in determining earnings than the decision to go to college. The difference between the lifetime wages of college and high school graduates is \$1 million; the difference between the highest- and lowest-paying college majors is \$3.4 million.”
- Discuss the implications of this finding on the students’ decisions about pursuing higher education going forward. As they get older and closer to making these decisions, what other information will they want to gather?
- Direct students to submit an exit ticket answering the question: How can graphs help me make decisions?

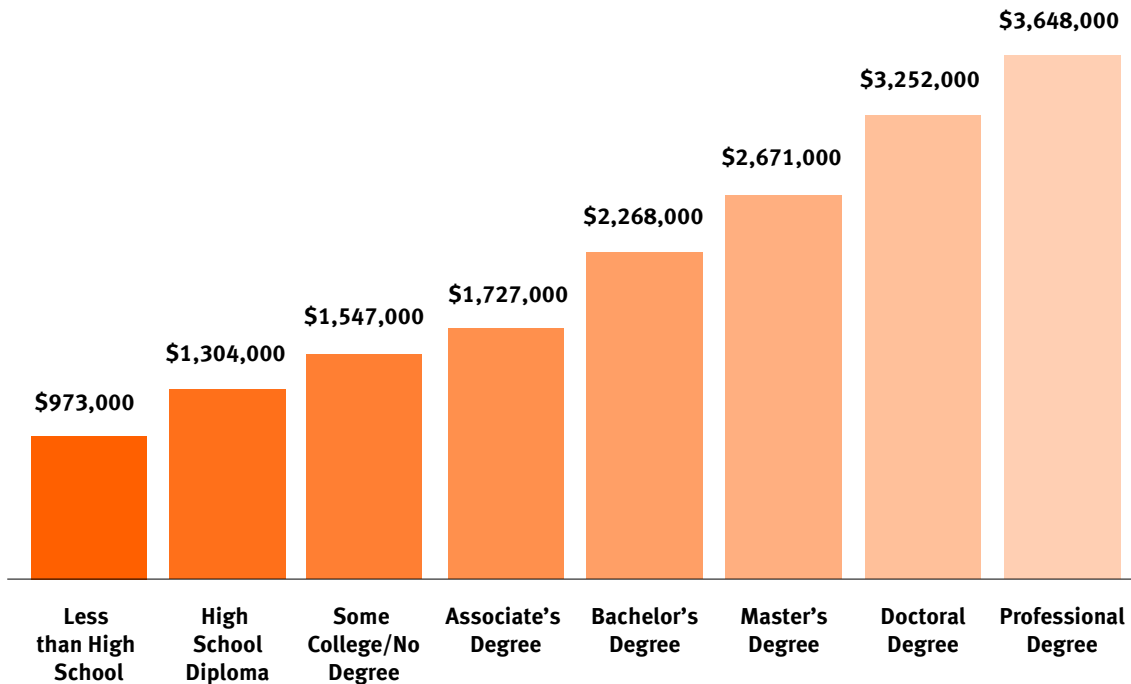
Extend

- **Writing:** The data shows that individuals who go to college and major in fields such as business or STEM are likely to earn much more money over the course of a lifetime than those in some other fields. Challenge students to consider and write about what would happen if everyone made their education and career decisions based on income potential alone.
- **Mathematics:** Challenge students to calculate the percentage differences between income levels in the various graphs.
- **Technology:** Invite students to explore the College Major Earnings Tool and create a spreadsheet with information on five majors of interest. If desired, students can obtain data for a specific state and compare it to national amounts.
- **Research:** Direct students to further explore the research in [The Economic Value of College Majors](#) report. Students should examine the data for a career or major that interests them and compare that to another major.
- **Family:** Encourage students to discuss the value of a college education with their family. What expectations do family members have about students’ futures?

Median Lifetime Earnings

Directions: Analyze the graph below and answer the questions that follow.

FIGURE 1: MEDIAN LIFETIME EARNINGS BY HIGHEST EDUCATIONAL ATTAINMENT, 2009 DOLLARS



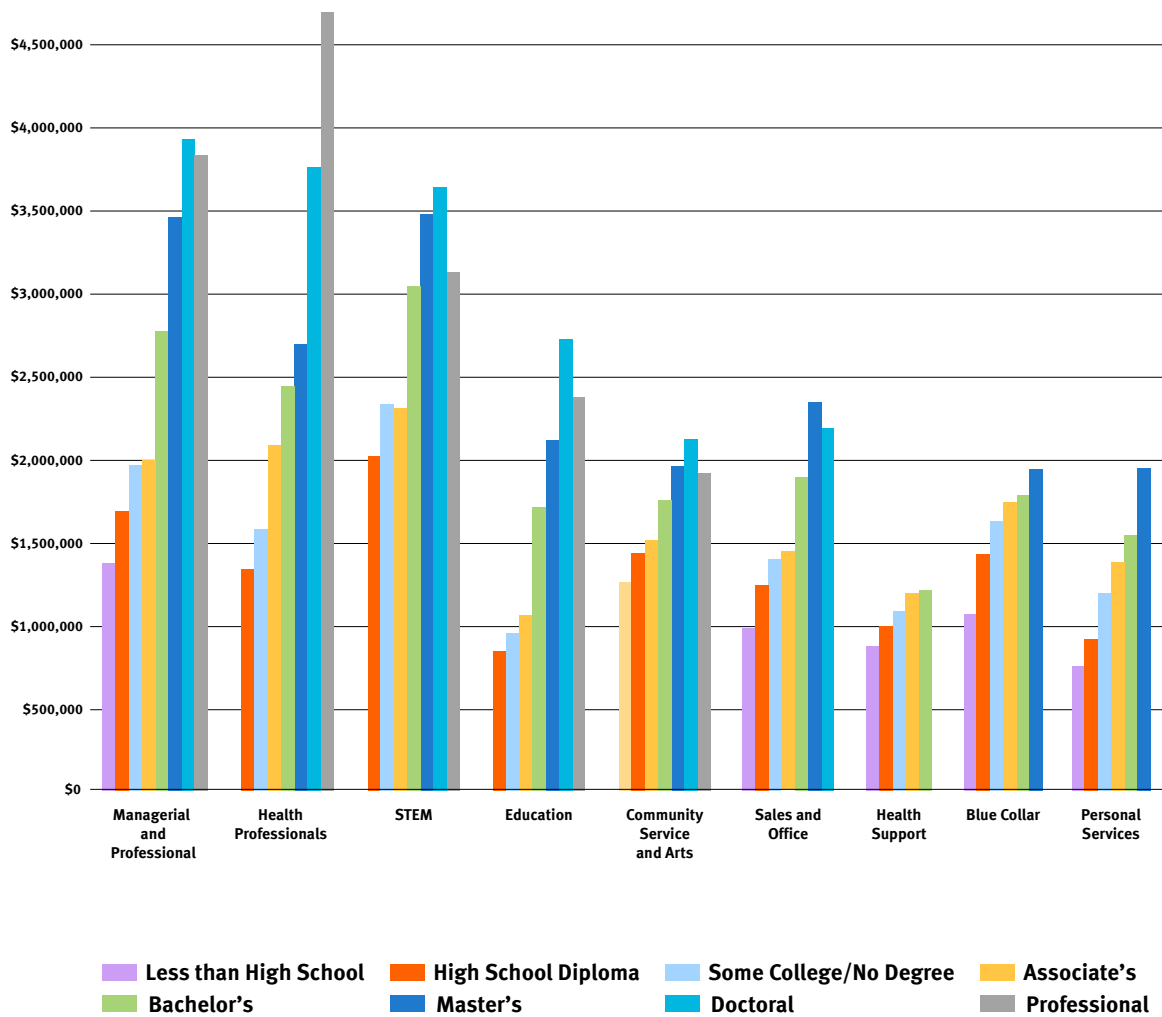
Source: Georgetown University Center on Education and the Workforce, [The College Payoff](#)

1. How much more money is a high school graduate expected to earn over the course of a lifetime than someone that drops out of high school?

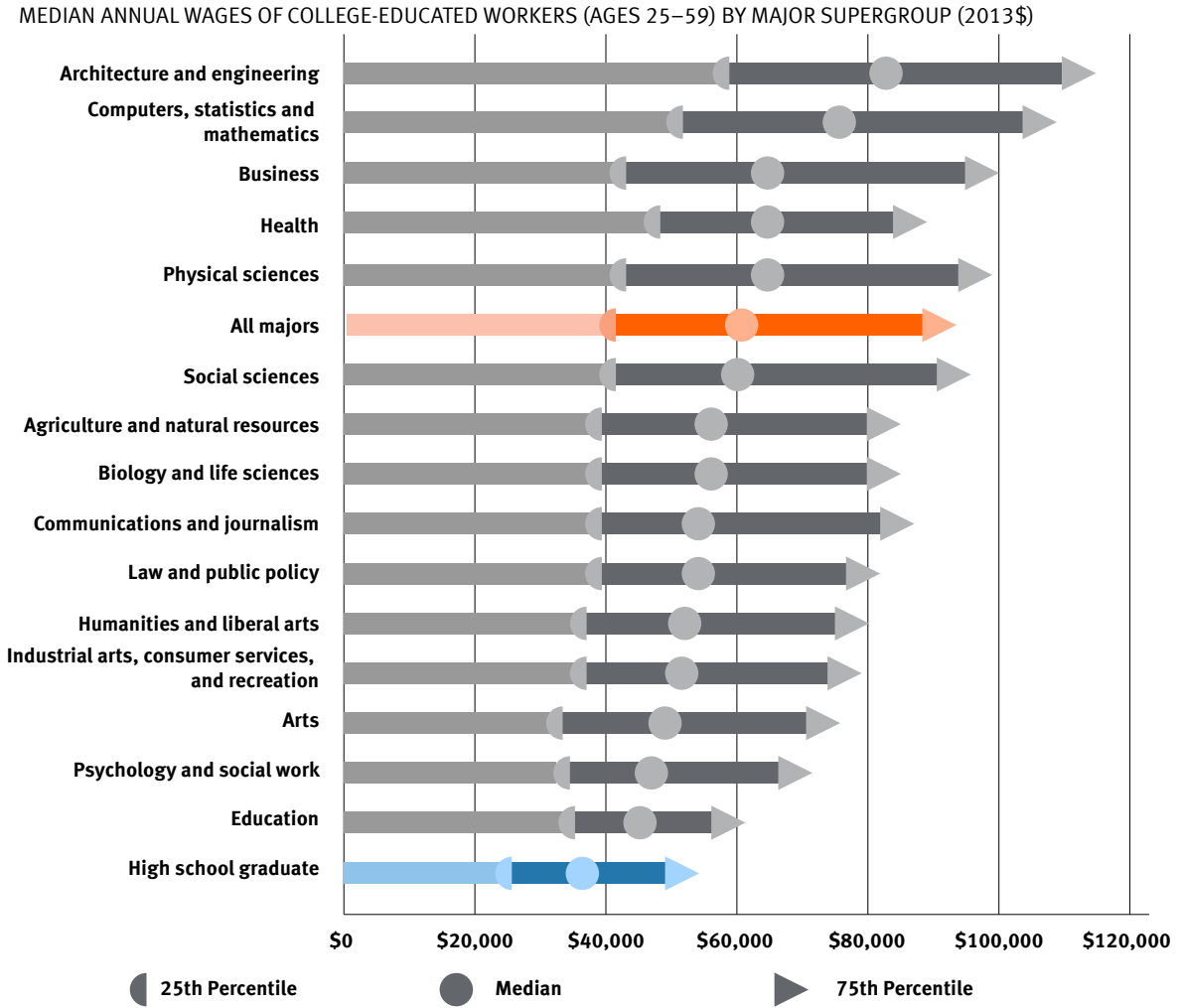
2. If the information in the chart is based on people working for 40 years, what is the average annual earnings of a person with a bachelor's degree?

3. How much more can a person with a bachelor's degree earn than someone with a high school diploma each year?

FIGURE 4: LIFETIME EARNINGS BY EDUCATION AND OCCUPATION, 2009 DOLLARS



Source: Georgetown University Center on Education and the Workforce, [The College Payoff](#)



Source: Georgetown University Center on Education and the Workforce, [The Economic Value of College Majors](#)