

Contextualized Curriculum

for Adult Learners in Math and Literacy

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Making Decisions with Data

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Using data analysis to track technical problems with hardware and software

Industry Sector: [Information Technology](#)

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Common Core State Standards

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

Statistics and Probability:

S-ID: Interpreting Categorical and Quantitative Data

S-ID.1: Represent data with plots on the real number line (dot plots, histograms, and box plots).

S-ID.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S-ID.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

S-IC: Making Inferences and Justifying Conclusions

S-IC.6: Evaluate reports based on data.

Adult Basic Education Standards

Statistics and Probability

S-1: Collect, organize and represent data

S-1.3: Represent information so that it makes sense to other.

S-2: Read and interpret data representations

S-2.4: Extract simple information from a list or table.

S-3: Describe data using numerical descriptions, statistics and trend terminology

S-4: Make and evaluate arguments or statements by applying knowledge of data analysis, bias factors, graph distortions and context

S-4.3: Visually identify “who has more,” and use some numbers to compare quantities.

S-4.4: Support simple statements with data.

S-4.5: Use “most of” statements to support arguments.

Industry Overview

From computer programmers to [web developers](#), and from network administrators to technical support specialists caring for the IT infrastructure, there are information technology (IT) careers available in every sector of the economy. While some people in this field work for IT companies, IT skills and services are needed in fields as wide-ranging as financial services, medical services, biotechnology, engineering and environmental services¹. The IT industry designs, develops, manages and supports the hardware, software, multimedia and networks we depend on in our daily lives and businesses. IT has revolutionized our world—from the ways we communicate to how we find information to how businesses operate. Job growth in the US IT industry is high and is projected to continue for many occupations within the industry. The field is constantly growing and changing and there are high levels of competition which makes it important for IT workers to keep updating their skills and to understand the latest technologies.

Careers in Information Technology²

Information technology careers are divided into four pathways: Network Systems, Information Support and Services, Programming and Software Development, and Web and Digital Communications.

Careers in Network Systems involve network analysis, planning and implementation, including design, installation, maintenance and management of network systems. Examples of network systems occupations include: network administrator, network technician, PC support specialist, telecommunications network technician, data communications analyst, and security administrator.

Careers in Information Support and Services involve IT deployment, including implementing computer systems and software, providing technical assistance, and managing information systems. Successful IT deployment is critical to the success of most organizations—the management and sharing of information depends on non-IT workers having functional computers, software and databases that meet their needs, and support when things aren't working. Information systems and support occupations include [database](#) administrator, enterprise systems engineer, help desk specialist, technical support specialist, and technical writer.

Careers in Programming and Software Development involve the design, development, implementation and maintenance of computer systems and software and require knowledge of computer operating systems, programming languages and software development. While many of the career opportunities in this area are in software companies, large organizations of other types—such as financial services—also offer many opportunities. Programming and software development careers include: software applications architect, operating systems designer/engineer, computer programmer, video game developer, applications engineer, and applications developer.

Careers in Web and Digital Communications involve creating, designing and producing interactive multimedia and social media products and services and include development of digitally-generated or computer-enhanced media used in business, training, entertainment, communications and marketing. Organizations of all types and sizes use digital media (such as the Internet and social media platforms) to communicate with existing and potential customers, to track transactions, and to collaborate with colleagues. Occupations in this pathway include web designer, webmaster, 3D animator, virtual reality specialist, and multimedia producer.

Mathematics and Literacy Skills Needed in Information Technology

The complexity of the IT industry, including the rapid pace of change in technology, requires workers to continuously upgrade their skills. Jobs in this industry require good problem-solving, critical-thinking, and reasoning; clear and professional communication; and a strong background in mathematics. Thus, in addition to technical skills specific to each job, mathematics and literacy skills are crucial for success in all occupations across the industry. Literacy is essential in this field as it is heavily dependent on written and oral communication, and workers need to be able to read, understand, and implement highly-technical content. Workers in this industry must communicate with clients, colleagues, and other departments and staff, including executives.

Regardless of how technologies change, a strong foundation in mathematics, particularly with such core areas as mathematical operations and number sense, measurement and estimation, ratios and proportions, and data analysis is very useful in this industry. For example, programmers and developers must be able to employ quick and competent computation and have the ability to select and apply the best mathematical model or formula to solve problem at hand.

Career Opportunities in IT with Education from Community Colleges

Massachusetts Community Colleges play a crucial role in preparing students for careers in IT across all sectors of the industry. The fifteen community colleges offer associate degree and certificate programs that prepare students to enter occupations across all sectors of the industry, from network administrators to technical support specialists to computer programmers to Web designers. For example, [Cape Cod Community College's Department of Business](#) has an IT program that prepares students for a range of positions through both the Information Technology A.S. degree and certifications that offer skills in specific concentrations in this field, such as networking and web design.

Recent Career Opportunities in Massachusetts

The following is a sample of IT job listings in Massachusetts that require associate's degree or certificate:

- Help Desk Technician [[show](#)]
- PC Technician [[show](#)]

The following is information about hires of recent IT graduates from Massachusetts community colleges:

- [Bristol Community College, Computer information Systems: Computer Networks](#)
- [Mount Wachusett Community College, Computer Information Systems](#)

Employment Outlook for Information Technology

Given the ubiquity of IT in the U.S. and the world today, employment in this industry continues to boom. Even during the current recession, there has continued to be high demand for workers with good technical, problem-solving and critical-thinking, and communication skills in the IT industry. The U.S. Bureau of Labor Statistics reported in its 2012-13 edition of the Occupational Outlook Handbook that employment in the industry is expected to grow "much faster than the average" of all occupations through 2020. Massachusetts has very high levels of employment and numbers of job openings in many IT occupations across the state. In 2011, it was one of the top seven states for employment opportunities in the industry. Furthermore, Middlesex and Suffolk counties were among the top 20 counties nationally listing IT positions.

However, within the IT industry, job growth and openings vary due to technological changes and competition (especially foreign). For example, employment for computer programmers in Massachusetts and nationally continues to be high, but is declining—future jobs will go to people with strong technical, cognitive, intrapersonal, and interpersonal skills. Likewise, lower-skilled jobs such as computer support specialists will have lower employment growth due to outsourcing (though help desk personnel are always needed in larger firms to assist non-IT staff with maintenance, [troubleshooting](#), and repair). The highest growth areas in IT—nationally and in Massachusetts—are in such occupations as computer and information systems managers, computer systems analysts, and computer specialists.

Resources

Employment Outlook

- [Massachusetts Career Information System](#)
- [U.S. Bureau of Labor Statistics: Occupational Outlook Handbook, Computer and Information Technology](#)
- [Jobs for the Future: An Examination of the Information Technology Job Market \(2012\)](#)

Occupational Information

- [Massachusetts Career Information System](#)
- [U.S. Bureau of Labor Statistics: Occupational Outlook Handbook, Computer and Information Technology](#)
- [WorkKeys Occupational Profiles](#)
- [WorkKeys: Occupations and Key Skills](#)
- [Information Technology Career Clusters](#)
- [Information Technology Career Frames](#)

¹<http://www2.edc.org/ewit/materials/ITCCBRO.pdf>

²As cited in <http://www2.edc.org/ewit/materials/ITCCBRO.pdf>

Workplace Scenario (8th Grade Level)

This scenario is based on the work of a help desk specialist. For more information, view [this video](#).

You are the primary IT support person in your aunt's new storefront IT consulting firm. Your aunt's role is to build a business-to-business network. Your role is to be a Help-Desk Specialist. You provide an initial response to customer computer issues. You also solve small IT problems and refer more complex problems to coworkers. You track the service records associated with each problem you solve. Every day you answer requests for computer technical support from people in the community. This support occurs by phone, email and website. As needed you take care of "walk-ins." These are customers who bring their computers into the shop to help with more complex problems. For each support request, you open a new [ticket](#) in the company's electronic [database](#). In that [database](#) you record the type of problem the person is having. You log how much time was spent in solving the problem. You also note payment (if any) made for service and the solution that solved the problem. Lastly, you record who solved the problem.

At the end of each month you analyze the data from the company's [database](#). You provide your aunt with a report. The report details the numbers and percentage of the types of IT requests that you have received and processed. You track the company's IT services in three categories. The first is requests for information. This category includes questions such as: What is your website address? How do I fill out the online request form? Do you have recommendations or resources for choosing a new printer? The second category is technical support. For example, someone might have a virus on their computer. Or, a customer might need help opening email attachments. The third category is requests for service. For example, a customer might need a new keyboard or mousepad.

You also track other data. For example, you track the average time needed to solve each type of problem. It is also important to monitor the costs associated with solving the problems. You check the revenue generated from paying customers. You also track the investments made in providing free IT

support to the community. These analyses will help your aunt make key business decisions. For example, they will help her decide when the company should pull back these free services and begin to charge customers. It will also help her understand how much to charge customers. Finally it will give her information to define her target customer and refine her marketing strategies.

Workplace Scenario (High School Level)

This scenario is based on the work of a help desk specialist. For more information, view [this video](#).

You are the primary IT support person in your aunt's new storefront IT consulting firm. While she is busy building a business-to-business network, your primary job as Help-Desk Specialist is to provide an initial response to customer issues (e.g. my computer won't boot up), solve small IT problems, refer more complex problems to colleagues, and track the service records associated with each problem he solves. Every day you answer requests for computer technical support by phone, email and website from people in the community. As needed you take care of "walk-ins" who bring their computers into the shop to help with more complex problems. For each support request, you open a new [ticket](#) in the company's electronic [database](#). In that [database](#) you document the type of problem the person is experiencing, how much time was spent in solving the problem, and payment (if any) made for service, the solution that solved the problem, and who solved the problem.

At the end of each month you analyze the data from the company's [database](#). You provide your aunt with a report on the numbers and percentage of the types of IT requests that you have received and processed. You track the company's IT services in three categories: 1) requests for information (What is your website address? How do I fill out the online request form? Do you have recommendations or resources for choosing a new printer? 2) technical support such as, "I have a virus on my computer, can help me get rid of it?" or "I can't open e-mail attachments;" and 3) requests for service, such as "I need a new keyboard" or "I need a new application" or "I spilled a drink on my computer and now the mousepad doesn't work."

You also track the average time needed to solve each type of problem, the costs associated with solving the problems, the revenue generated from paying customers and the investments made in providing free IT support to the community. These analyses will help your aunt make key business decisions, including when the company should pull back these free services and begin to charge customers, how much to charge customers, and how to define her target customer and refine her marketing strategies.

Core instructional context

Data analysis can help us to make better decisions in both our daily lives and in our work. Students may be used to reading information in charts and graphs, making sense of the data, and then making decisions based on that data—decisions about their finances, what type of automobile to purchase, whether and where to buy a house, or about where to send their children to school. In the workplace, data analysis can be crucial—in many industries, there is a strong emphasis on ensuring that the quality of a product or service remains stable (and high) by constantly analyzing data about the process and making improvements.

Data-based decision-making in business, especially in IT often involves data that is constantly changing. For example, in order to find the computer with the most processing power for the dollar, or the best value in a new tablet, requires that the data used be current and optimized for your target audience. It can be challenging to evaluate products as they are newly released and use new evolving technologies. IT professionals will often rely on data from manufacturers and outside evaluators to determine which product meets their needs. To do this, they must be able to work with multiple tools used in data analysis, starting with charts, graphs, tables and spreadsheets, and understand the mathematical meaning of a percentage, rate, and measures of central tendencies (mean, median and mode). In addition, tools of statistical analysis, rate of change, and other higher order mathematical ideas could be of great use.

Worked Examples

You've been trying to convince your aunt to focus on social media to market to customers. In the past year, your aunt created a Facebook page for the business and she is using that page to receive help-desk requests. She's also started purchasing Facebook ads.

- a. Last year (before Facebook marketing), 85% of requests came in by phone, 5% came through the company website (which your aunt has phased out and replaced with the Facebook page), and 10% were walk-ins. How does that compare with the source of the requests during this past month? Use the monthly data from this [spreadsheet](#).

Answer:

Calculate the percentage of calls that came in by phone by dividing the number of requests by phone by the total number of requests.

- Find the total number of requests (this can be found by looking at the number of rows in the spreadsheet and subtracting one for the header, or by using the COUNTA function: `=COUNTA(D2:D51)`): 50
- Find the number of requests that came in by phone: One way to find this is COUNTIF: `=COUNTIF(D2:D51,"phone")`, which is 34. Another way to count would be to sort the spreadsheet by request type and count the rows.

So, this month, $34/50 = .68$ or 68% of the requests came in by phone

Calculate the percentage of requests that came in by the website by dividing the number of requests by website by the total number of requests.

- The total number of requests is 50.
- Find the number of requests that came in by the website using COUNTIF: `=COUNTIF(D2:D51,"website")`, which is 13 (or this is small enough, you could count. . . but as data sets get larger, use of spreadsheet functions become more necessary).

This month $13/50 = .26$ or 26% of the requests came through the website/Facebook page

Calculate the percentage of walk-in requests by dividing the number of walk-ins by the total number of requests.

- The total number of requests is 50.
- Find the number of walk-in requests using COUNTIF: `=COUNTIF(D2:D51,"walk-in")`, which is 3 (or this is small enough, you could count)

This month $3/50 = .06$ or 6% were walk-ins

Note: When using the COUNTIF function with text, it is not case-sensitive, but any trailing spaces will be matched. So "phone " is different than "phone".

- b. Create a graph that shows the difference in the source of the calls from last year to this year.

Answer:

A bar graph is a good choice to show the difference in requests from last year to this year. Plot the percentage along the vertical axis (y-axis) and the type of request along the horizontal axis (x-axis). Use different colors so that a quick distinction can be made between the two timeframes.



Contextualized learning activities

Introduction to the Scenario

Have students read the scenario, circling or highlighting the math-related phrases and concepts. Have students work with a partner to share the terms they came up with, as well as discuss what math skills and processes would be used in this scenario.

Discuss the role and purpose of using a spreadsheet to organize data. Have pairs [brainstorm](#) the columns of information they might include in this [database](#), based on the information in the scenario. Then have students open the [spreadsheet](#) and compare it to their brainstormed list. Have students look through the [database](#) and identify any information or category of information that they don't understand. Tell students that the type of information included on this [database](#) has been simplified for the purpose of their activities. Have them [brainstorm](#) a list of other information that might be included on a database like this in real life (e.g., contact information for clients, perhaps [client](#) demographics, more detailed explanation of request, etc.).

Entering Data

Provide students with the following scenario:

On June 29th, at 4 p.m., you received a phone call from a woman named Miriam Doolittle. She is a 79 year-old woman who says her son just bought her a digital camera. She is having trouble figuring out how to connect her camera to her PC so she can download photographs from her camera and organize and print her photos. You spend about 30 minutes on the phone with her, walking her through the process of downloading the software that came with her camera, and explaining how to access and organize folders to keep her images. You do not charge her anything for your work.

Have students work with a partner to figure out how to enter the information from this scenario into the [database](#). Tell students that not all of the information from the scenario will be included in the [database](#).

Answer:

Created	Request Type	Request Detail	Call Origin?	Customer Type	Business	Contact	Time to Resolve (in hours)	Billing
June 29	information / technical support	help connecting camera to computer and using software	Phone	residential	N/A	Miriam Doolittle	0.5	\$0.00

Contextualized Problems: Data Analysis*

*Note: The answers provided for these problems do not take into account the additional data added by the students in "Entering Data" (for Miriam Doolittle)

1. Over the last month, what percentage of your requests were information, tech support, and service requests?

Answer:

Information: 28%

Tech support: 50%

Service requests: 22%

2. What was the total amount of time spent on help-desk requests this month?

Answer: 104.5 hours

3. Your aunt wants to know about how long it takes to resolve each request.

- a. What is the range of time to resolve requests?

Answer: 0.25 hours (15 minutes) to 10 hours

- b. Use three measures of central tendency to find the average time it takes to resolve each request.

Answer:

Mean: 2.09 hours

Median: 2 hours

Mode: 2 hours

- c. Create a scatterplot of the time spent resolving each quest. What observations can you make that the measures of central tendency didn't tell you?

Answer:



Observations: There is one clear outlier—10 hours—that may be skewing the data analysis.

4. Create a new column on the spreadsheet, in which you calculate the revenue per hour earned for each request. What is the revenue per hour for each type of IT request?

Answer: (Use the formula " $=I2/H2$ " [Billing divided by Time to Resolve])

For information requests: \$0 per hour

Tech support: \$30 per hour

Service requests: \$50 per hour

5. Create a graph of the revenue earned for service requests as a function of time spent to resolve.

Answer:



- a. Write the equation of the line that represents the graph.

Answer: $R = 50t$, where R is the total revenue and t is the time spent on the request

- b. What is the slope of the line? In terms of the service request, what does the slope represent?

Answer: The slope is 50. It represents the cost per hour of a service request.

- c. Is the function an example of direct variation?

Answer: Yes. The two variables R and t are related in a constant ratio.

6. Make a graph of the revenue earned for tech support as a function of time.

Answer:



7. What can you tell about the cost of services by looking at the graphs?

Answer: Since the slope of the line representing service calls is steeper than the slope of the line representing tech support, we know that service calls are more expensive.

8. Suppose there was a service plan that reduced the hourly rate to \$25 by requiring a one time fee of \$150.

- a. Graph this new plan, representing Revenue as a function of time and includes a \$150 one-time fee.

Answer:



- b. How does the one-time fee affect the graph of the line? What is the equation of this line? The slope?

Answer:

The line starts higher up on the y-axis.

The equation is $R = 25t + 150$.

The slope of this line is 25.

- c. After how many hours would the customer be saving money using the service plan as opposed to the \$50 hourly rate?

Answer:

After 6 hours the customer breaks even. So in a service call of more than 6 hours, the customer saves money.

This can be found by looking at the graph of the two lines. The point of intersection ($t = 6$) shows the break even cost.

or

Solving the system of equations $R = 50t$ and $R = 25t + 150$ algebraically:

$$50t = 25t + 150$$

$$25t = 150$$

$$t = 6$$

9. You've been trying to convince your aunt to focus on social media to market to customers. In the past year, your aunt created a Facebook page for the business and she is using that page to receive help-desk requests. She's also started purchasing Facebook ads.

- a. Last year before Facebook marketing, 85% of their requests came in by phone, 5% came through the company web site (which she has phased out and replaced with the facebook page), and 10% were walk-ins. How does that compare with the source of the requests during this past month?

Answer: This month, 68% of the requests came in by phone, 26% of the requests came through the web site / facebook page, and 6% were walk-ins.

- b. Create a graph that shows the difference in the source of the calls from last year to this year.

Answer:



Contextualized test items

You've begun entering data for the next month of help-desk requests for your aunt, making adjustments for some changes she's made to the business. One thing she noticed with phone requests was that you often spend time on the phone with a [client](#) listening to their problem before opening a [ticket](#) and starting to charge them. She's asked you to record the time that each phone call begins and ends, since that is not included in the time spent resolving the transaction, and therefore, time that you are not earning any income.

Below is a portion of your [database](#) for three phone requests for technical support.

Contact	Request Detail	Time Call Began	Time Call Ended	Time to Resolve (in Hours)	Billing (Total Amount for Transaction)
Olivia Fig	can't open attachment	9:05	9:20	0.5	\$17.50
John Voltrava	no Internet connection	10:40	10:45	2.25	\$78.75
Alexandra Petrovsky	computer not recognizing printer	10:50	11:10	2	\$70.00

1. How long was spent on the phone with Olivia Fig before opening a [ticket](#)?

Answer: 15 minutes

2. Express the amount of time spent on the phone with Olivia to the amount of time resolving her request as a ratio.

Answer: 15 minutes: 30 minutes, or 1:2

3. What was the average amount of time spent on the phone with all three clients?

Answer: 13.33 minutes

4. Your aunt changed the pricing for technical support requests. What is the hourly charge for time spent resolving requests now?

Answer: \$35 an hour

5. Match each graph to the correct graph title, based on the data above:

- Amount income as a function of amount of time spent to resolve
- Duration of Phone Call (before opening a transaction [ticket](#))
- Comparison of Phone Call Duration and Time to Resolve Transactions

1. 

Answer: b. Duration of Phone Call (before opening a transaction [ticket](#))

2. 

Answer: a. Amount income as a function of amount of time spent to resolve

3. 

Contextualized project

Making Recommendations Based on Data Analysis*

*Note: The answers provided for this activity do not take into account the additional data added by the students in "Entering Data" (for Miriam Doolittle)

Your aunt would like you to use the help-desk data to make recommendations for how to improve her business. She wants to have a better sense of who the target customer is, as well as the types of requests that take the most time, and the types of transactions that earn the most revenue for her business. She would like three separate reports presented to her: Target customer, Time spent, Pricing. Your aunt is a visual learner and would like to see charts and graphs where necessary to help her make business decisions. Your aunt has told you many times that she is more of a visual learner than a "numbers person." In that vein, she would like you to include charts and tables or graphs, where applicable, to help her make sense of the data and make decisions about her business.

Divide the class into small groups. Assign each group one of the three reports to prepare and present to their aunt. For each question, students should decide what type of data analysis to do in order to answer the question, as well as the best way to present their findings (e.g. pie chart versus scatterplot). Have each group present their answers and recommendations to the class.

Group I: Who is using our help-desk services? (Target Customer)

Questions:

1. What is the percentage of residential customers versus business customers?

Answer: 60% residential customers versus 40% business customers

2. How does the total time spent on transactions for residential customers compare to total time spent on transactions for business customers?

Answer:

Total time for business customers: 60.25 hours

Total time for residential customers: 44.25 hours

3. How does the average time spent per transaction compare for business and residential customers?

Answer:

3.01 hours per transaction for business customers (mean, including outlier of -10 hours)

1.48 hours for residential customers (mean)

4. How does the total amount of revenue earned for residential customers compare to the amount earned for business customers?

Answer:

\$1,985.00 earned from business customers

\$1,567.50 earned from residential customers

5. What is the average amount earned per transaction for business and residential customers?

Answer:

Earned average of \$99.25 per transaction from business customers

Earned average of \$52.25 per transaction from residential customers

6. How many of our customers are repeat customers? How does that differ for residential and business customers?

Answer: Three of the residential clients are repeat customers, with one [client](#) (Ondine Jones) calling 10 times over the last month (though all but two of those calls were information requests, which cost the business time and didn't earn any revenue).

7. Your aunt is considering shifting the focus of the company entirely to business clients instead of residential clients. She has been thinking about this for a long time, but last week when she noticed that you spent more than a half an hour on the phone with a woman who couldn't attach her camera to her computer, she started thinking seriously about whether serving residential clients is worth your company's time. She thinks that if she focuses on business clients, she can focus on the higher-tech more involved transactions, which will earn her company more money. However, she doesn't want to alienate loyal customers, especially ones who continue to bring her business as well as refer other people to her.

What do you think—should your aunt stop taking residential clients? Why or why not? What data supports your recommendation?

Possible Answers: Answers will vary. Students might note that they have a lot more residential clients than business clients; however the revenue earned is higher for business customers—because the average time spent on them is longer, and the majority of the requests are for paid tech support (75% of the business clients' requests) and only 10% were free information calls, whereas 40% of the residential requests were for information, which doesn't earn any money.

8. What, if any, other general recommendations would you make to your aunt? What data supports this recommendation?

Answers will vary.

Group II: How are our help-desk technicians using their time? (Time)

Questions:

1. What was the total amount of time spent on all help desk transactions last month?

Answer: 104.5 hours

2. What is the total amount of time spent on information requests? tech support? service requests?

Answer:

Information: 4.75 hours

Tech support: 71.75 hours

Service requests: 28 hours

3. What is the average time spent per help-desk transaction?

Answer: 2.09 hours

4. What is the average amount of time spent per transaction for information requests? Tech support? Service requests?

Answer:

Information: 0.34 hours

Technical support: 2.87 hours

Service requests: 2.55 hours

5. What is the total amount of time spent on transactions, via phone, web requests, and walk-ins?

Answer:

Phone: 67.5 hours

Web site: 37 hours

Walk-in: 7 hours

6. How does time spent per transaction differ for requests received by phone, web requests, or walk-ins?

Possible Answers:

Phone: 1.99 hours

Web site: 2.31 hours

Walk-ins 2.33 hours

7. Your aunt is considering discontinuing walk-ins. Having walk-ins costs the business money because they need to keep their store front open at regular hours, costing money in electric bills, as well as having to pay employees regular hours even if there are no customers. She is most worried that walk-ins come in and spend a long time getting free information, but don't generate a lot of income for the business.

What do you think—should she eliminate walk-ins? Why or why not? What evidence supports your recommendation?

Possible Answers: Answers will vary. Students may point out that walk-ins did not account for a large percentage of business, but when they did come in, it did result in paid work, rather than free information.

8. What, if any, other general recommendations would you make to your aunt? What data supports this recommendation?

Answers will vary.

Group III: Are We Charging the Right Amount for Services? (Pricing)

Questions:

1. What was the total amount of revenue generated by all help-desk requests this month?

Answer: \$3,552.50

2. What was the total amount of revenue generated by tech support requests? Service requests? Information requests?

Answer:

Information requests: \$0

Technical support: \$2,152.50

Service requests: \$1,400

3. What is the average amount of revenue earned per request for all help-desk requests? How does that differ for information, tech support, and service requests?

Answer:

Average for all requests: \$71.05

Average for information: \$0

Average for tech support: \$86.10

Average for service requests: \$127.27

4. How many hours in total was spent filling requests this past month? What is the average income per hour spent filling requests?

Answer:

Total time: 104.5 hours

Average income per hour: \$34

5. What is the average income per hour filling information, tech support, and service requests?

Answer:

Information: \$0

Tech support: \$30 per hour

Service requests: \$50 per hour

6. Your aunt is considering changing the fees for services. First and foremost, she is wondering how much money she is "losing" by providing information services for free. She is considering charging a nominal fee for information requests, but she is not sure it will be worth it. She is also considering limiting the number of free information requests a customer makes. She says that as long as the amount of time spent on information services is less than 5% of the total time spent on requests, she will continue to provide them for free.

What do you think? Should she charge for information requests? Should she limit the number of requests per customer or the amount of time spent on a customer before charging a fee? Should she change any of the other pricing rates? Why or why not? What data supports your recommendation?

Possible Answers: Answers will vary. Students may note that the information requests are not affecting the bottom line that much (if they had not filled any information requests all month, their average per hour income would have been \$35.61 instead of \$34, which is not that big a difference). This past month, the amount of time spent on info request (4.75 hours) was exactly 5% of the total amount of time worked on help desk requests, which makes it a judgment call for the aunt.

7. What, if any, other general recommendations would you make to your aunt? What data supports this recommendation?

Answers will vary.

Additional or extension activities, multimedia, readings and/or resources

Extension: How does Facebook Know I'm pregnant I'm interested in Sci-fi moviesI Want to Lose Weight I went on a cruise last year . . . ?

Have students conduct research on how companies such as Facebook use customer's own data to market services to them. For those students with Facebook accounts, have them write down the ads that pop up on their Facebook page. Have students compare the ads with one another and discuss what data Facebook is looking at when targeting particular ads to you. Discuss the ethics as well as the effectiveness of this type of social media marketing strategies.

Students may find the following resources helpful:

- [Facebook for Business](#)
- [Facebook Ad Tutorial, Testing Your Marketing](#)
- [Simple Guide To Creating A Facebook Ad](#)
- [Facebook Ads—Still Good Bang for your Buck](#), The Social Calling
- [Writing \(and Bidding on\) Facebook Ads: An Advertising Tutorial for Artists](#)

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