

**Who We Are**

If you're a mobile banking user or pay your bills online – if you interact with a financial institution at all – chances are you're more familiar with Fiserv than you realize.

Fiserv is a global organization with more than 14,500 clients and 21,000 associates worldwide and takes pride in its mission to enable clients to achieve best-in-class results. The company is highly regarded for its financial services technology and services innovation, including award-winning solutions for mobile and online banking, payments, risk management, data analytics and core account processing.

Fiserv is helping its clients push the boundaries of what's possible in financial services, delivering deep expertise and innovative solutions to help financial institutions, businesses and consumers move and manage money faster and with greater ease than ever before.

**Quick Facts Lincoln Contact Information**

Fiserv, Inc. (NASDAQ:FISV) Jamie Deterding, Senior Vice President  
Year founded: 1984 1345 Old Cheney Road  
Headquarters: Brookfield, Wisconsin Lincoln, NE 68512  
Locations: 148 worldwide (402) 423-2682  
Associates: Approximately 21,000 jaime.deterding@fiserv.com  
Revenue: $5.1 billion in 2014

Information taken from <https://www.fiserv.com/index.aspx>

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 Courtney Beach and Doug Glasshoff

DATA: MA6.4.2.c, MA11.4.2.a, MA11.4.2.b Grades: 6 – 9

**Problem 1 Student Page**

**Central Tendency Comparison**

A new software update is being developed by Fiserv to improve their smartphone app offered to bank costumers. The following table represents the amount of time in seconds needed to open the next page after clicking on a link from the landing page during a software test.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.8 | 1.1 | 0.8 | 1.0 | 1.2 | 1.0 | 1.1 | 0.9 | 0.7 | 1.1 |
| 0.7 | 0.8 | 1.3 | 1.2 | 0.9 | 1.0 | 1.1 | 1.0 | 0.9 | 180 |

Calculate the mean and the median time needed to open the link. Compare and contrast the findings and how you would report your findings to the committee evaluating the software update.

 Courtney Beach and Doug Glasshoff

DATA: MA6.4.2.c, MA11.4.2.a, MA11.4.2.b Grades: 6 – 9

**Problem 1 Teacher Page**

**Central Tendency Comparison**

A new software update is being developed by Fiserv to improve their smartphone app offered to bank costumers. The following table represents the amount of time in seconds needed to open the next page after clicking on a link from the landing page during a software test.

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Calculate the mean and the median time needed to open the link. Compare and contrast the findings and how you would report your findings to the committee evaluating the software update.

**ANSWER:**

Have the students use a spreadsheet (i.e. Microsoft Excel) to find the mean and the median of the data.

The sum of the data is 198.6 with 20 items. 

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| .7 | .7 | .8 | .8 | .8 | .9 | .9 | .9 | 1 | 1 | 1 | 1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 180 |

The middle of the data is the 10th and 11th items, which are both 1 second. 

Mean = 9.9 seconds (1.0 seconds without the 180)

Median = 1.0 seconds (1.0 seconds without the 180)

The use of the mean is not appropriate because of the outlier of 3 minutes (180 seconds) and does not represent the rest of the data.

 Courtney Beach and Doug Glasshoff

NUMBER SENSE Grades: 6 – 8

MA.7.1.2.a (ratios)

**Problem 2 Student Page**

**Employee value and performance**

**2a.)** Michael sold $15,000 of product in one week and Roger sold $22,000 of product in one week. Who would you get rid of? Is this enough information to make a good decision for your company? What additional information would be important in making a good decision?

**2b.)** As a sales manager for fiserv., there are five employees who work under you. Money is running tight and your boss has given you the task of deciding which of your employees should be let go. Based on the below data which captures one week of sales, identify which employee you would let go and why. Show your calculations below. (Data is arbitrary)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | # of years at fiserv. | Hourly wage | Sales for 1 week | Customer Rating out of 5 |
|  |  |  |  |  |
| Rose | 10 years | $19.75 | $20,000 | 5 |
| Lee | 8 years | $17.50 | $19,000 | 4 |
| Mary | 5 years | $15.90 | $25,000 | 2 |
| Kyle | 2 years | $13.25 | $21,000 | 4 |
| Sue | 15 years | $22.50 | $20,000 | 3 |

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NUMBER SENSE Grades: 6 – 9

Problem 2 Teacher Page

**Student Vocabulary**

Weekly Work Load – full time employees work 40 hours per week

**Optional Scaffolding Questions for Students**

How much does each employee cost the company in a 40-hour work-week?

What is the Profit/Employee Cost ratio?

**Solution:**

Problem #1: When students automatically choose to fire Michael begin a discussion on other factors that would be important in comparing between the two employees. Imagine Roger makes $15.00 an hour compared to Michael’s $35.00. Michael costs the company almost double, but does not bring in double the sales.

Problem #2: To begin, I would figure out the weekly salary of each employee.

|  |  |  |
| --- | --- | --- |
|  | Hourly wage | Weekly Salary |
|  |  |  |
| Rose | $19.75 | $790 |
| Lee | $17.50 | $700 |
| Mary | $15.90 | $636 |
| Kyle | $13.25 | $530 |
| Sue | $22.50 | $900 |

Then I would find the return on employee by dividing the sales by the cost to pay the employee.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Hourly wage | Weekly Salary | Sales for 1 week | Return on Employee |
|  |  |  |  |  |
| Rose | $19.75 | $790 | $20,000 | 25.31 |
| Lee | $17.50 | $700 | $19,000 | 27.14 |
| Mary | $15.90 | $636 | $25,000 | 39.31 |
| Kyle | $13.25 | $530 | $21,000 | 39.62 |
| Sue | $22.50 | $900 | $20,000 | 22.22 |

I would then rank the employees based on the profit they bring to the company.

Kyle

Mary

Lee

Rose

Sue

Finally I would look at the customer ratings.

Kyle 4

Mary 2

Lee 4

Rose 5

Sue 3

Based on these findings, I would fire Sue based on sales performance and customer ratings.

Students could come to different conclusions as long as they support their claim with data and evidence.

 Courtney Beach and Doug Glasshoff

DATA: MA12.4.2 Grades: 10 – 12

**Problem 3 Student Page**

**Confidence Interval**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.8 | 1.1 | 0.8 | 1.0 | 1.2 | 1.0 | 1.1 | 0.9 | 0.7 | 1.1 |
| 0.7 | 0.8 | 1.3 | 1.2 | 0.9 | 1.0 | 1.1 | 1.0 | 0.9 | 180 |

It was decided that any time less than or equal to 1.1 seconds would be an acceptable time to open the next page in an app. Construct a 95% confidence interval for the probability of that true population is less than or equal to 1.1 seconds based on the sample test.

 Courtney Beach and Doug Glasshoff

DATA: MA12.4.2 Grades: 10 – 12

**Problem 3 Teacher Page**

**Confidence Interval**

It was decided that any time less than or equal to 1.1 seconds would be an acceptable time to open the next page in an app. Construct a 95% confidence interval for the probability of that true population is less than or equal to1.1 seconds based on the sample test.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.8 | 1.1 | 0.8 | 1.0 | 1.2 | 1.0 | 1.1 | 0.9 | 0.7 | 1.1 |
| 0.7 | 0.8 | 1.3 | 1.2 | 0.9 | 1.0 | 1.1 | 1.0 | 0.9 | 180 |

**ANSWER:**

We are looking for a time less than or equal to 1.1 seconds. According to our sample test, 16 of the 20 items are below that time.

 80% of the sample data is less than or equal to 1.1 seconds





So, we are 95% confident that the time needed to open the next page will be less than or equal to 1.1 seconds between 62% and 98% of the time.

 Courtney Beach and Doug Glasshoff

NUMBER SENSE Grades: 6 – 8

MA.7.1.2.c

MA.11.1.2.c

**Problem 4 Student Page**

**Resource Request based on Project Timeline**

We are looking to convert 225 clients from solution 1 to solution 2. We know that the average implementation requires 4 resource days to complete the conversion. There are currently 13 employees within the implementation team of which 5 are available for these conversions.

a.) How long will it take the 5 employees to complete the conversion project?

b.) If management would like the project to be completed in 60 business days would additional resources be needed? If so, how many?

c.) If management approves hiring 4 additional resources how long will it take to complete the conversion project?

 Courtney Beach and Doug Glasshoff

NUMBER SENSE Grades: 6 – 9

**Problem 4 Teacher Page**

**Student Vocabulary**

Solutions – computer software

Implementation – downloading the software on all bank computers

Clients – banks buying the software

Resource days – work days Monday through Friday

**Optional Scaffolding Questions for Students**

Identify irrelevant information.

How many resource days are needed to convert all 225 clients?

Split the total workload by all the available workers.

**Solution:**

a.) Total Resource Days Needed:  resource days needed

Total Days it will take team:  days for the 5 team members

Total Months based on 20-day work months:  months

b.) Employees needed to split the work to get it done in 60 days: 

 people

Additional resources:  additional people needed

c.) New number of employees working on the project:  people

Number of days it would take the team to complete the project:  days

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NUMBER SENSE/ALGEBRA Grades: 10 – 12

MA.11.2.3.a

**Problem 5 Student Page**

**Product Pricing**

Product Pricing

Your department has been tasked with pricing the latest software called Round Up. Round up rounds every debit charge up to the nearest dollar and transfers the pennies to your savings account. It cost fiserv. $1,500,000 to develop the software and it will cost $3,200 to implement the software for each client.

If 250 clients are predicted to buy the software, how much should fiserv. charge per sale if you need to reach an ROI of 30%?

If 470 clients are predicted to buy the software, how much should fiserv. charge per sale if you need to reach an ROI of 25%

 Courtney Beach and Doug Glasshoff

NUMBER SENSE/ALGEBRA Grades: 6 – 9

**Problem 5 Teacher Page**

**Software Profitability**

**Student Vocabulary**

Client – banks buying the software

Return on Investment – ROI total profit divided by the total cost to the company

**Solution**

Scenario 1:

Total cost to fiserv.: 

An equation to solve for the price: 

Let x be the price fiserv should charge for the software.

Based on this equation, the software should cost $11,960 per sale.

Scenario 2:

Total cost to fiserv.: 

An equation to solve for the price: 

Based on this equation, the software should cost $7,989.36

 Courtney Beach and Doug Glasshoff

NUMBER SENSE Grades: 6 – 9

MA.7.1.2.c

MA.11.1.2.c

**Problem 6 Student Page**

**Project Production Decision**

A company is looking at a new product that could be sold for $10,000 per sale. The sales team estimates 50 sales will be made in year 1, 100 sales in year 2 and 25 sales in year 3, 4, and 5. The following expenses have been defined as part of the new product:

a.) The product team estimates it will cost $1,000,000 to develop.

b.) The installation team expects the installation to require 5 days of implementation services at the cost to the company of $3,000 per installation. Should the company move forward with this project?

c.) What is the break-even point in number of sales?

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NUMBER SENSE Grades: 6 – 9

**Problem 6 Teacher Page**

**Student Vocabulary**

Installation – downloading the software on all the banks computers

Break-even point – the number of sales where the cost to develop the software has been paid off

**Optional Scaffolding Questions for Students**

How many sales are predicted at the end of 5 years?

Based on this prediction of sales, how much money will fiserv. be earning?

How much profit will fiserv. gain on each sale based on the cost of implementation?

After how many sales will the 1,000,000 development fee be paid off?

At the end of the 5 years, what will the net gain to fiserv. be?

**Solution:**

Predicted number of software sold after 5 years: 

Profit to fiserv. given predicted sales: 

Cost to fiserv. to develop and implement: 

Fiserv. net gain per sale: 

Number of sales to pay of 1,000,000: 

It will take 143 sales to pay off the initial cost to fiserv. . Every sale after 143 is profit. So 82 sales will be strictly profit for fiserv. at $7,000 a pop. Therefore fiserv.’s net gain would be $574,000 which is a 34% return on investment.

 Courtney Beach and Doug Glasshoff

DATA: MA 7.4.3.c, MA 7.4.3.g, MA 11.4.3 Grades: 6 – 9

**Problem 7 Student Page**

**Probability Matrix**

The following diagram shows the probability matrix of a person clicking on a link using a smartphone app created by Fiserv.

**LOGIN**

**LANDING PAGE**

**BILL**

**PAY**

**BALANCE INQUIRY**

**LOGOUT**

1.0

0.1

0.3

0.7

0.2

0.1

0.8

0.7

**A)** What is the probability that once a person logs in, they do a balance inquiry?

**B)** What is the probability that a person will do a balance inquiry after bill pay?

**C)** What is the probability that a person will go back to the landing page after doing a balance inquiry?

**D)** If 1000 people log in, how many will pay a bill first?

**E)** If 1000 people log in, how many people will do a balance inquiry and then logout?

 Courtney Beach and Doug Glasshoff

DATA: MA 7.4.3.c, MA 7.4.3.g, MA 11.4.3 Grades: 6 – 9

**Problem 7 Teacher Page**

**Probability Matrix**

The following diagram shows the probability matrix of a person clicking on a link using a smartphone app created by Fiserv.

**NOTE:**

Each arrow represents the probability that a person goes from one page to another in the direction the arrow is pointing. For example, there is a 20% chance that a person will go from balance inquiry back to the landing page.

**LOGIN**

**LANDING PAGE**

**BILL**

**PAY**

**BALANCE INQUIRY**

**LOGOUT**

1.0

0.1

0.3

0.7

0.2

0.1

0.8

0.7

**A)** What is the probability that once a person logs in, they do a balance inquiry? **70%**

**B)** What is the probability that a person will do a balance inquiry after bill pay? **10%**

**C)** What is the probability that a person will go back to the landing page after doing a balance inquiry? **20%**

**D)** If 1000 people log in, how many will do a balance inquiry first? **700**



**E)** If 1000 people log in, how many people will do a balance inquiry and then logout?

 **240**

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NUMBER SENSE Grades: 6 – 9

MA.6.1.1.d

MA.7.1.2.c

**Problem 8 Student Page**

**Software Profitability**

A 10-year-old software is currently used by 75 clients and is in need of an update. The development of the update will cost Fiserv $100,000 and will take 2 days of implementation services that will cost the company $2,500 per client. The clients are willing to pay $4,700 for the update. Fiserv recommends a 25% profit gain to the company to justify spending time on a project. Should you sunset the software or send it to production? Explain your reasoning.

 Courtney Beach and Doug Glasshoff

NUMBER SENSE Grades: 6 – 9

**Problem 8 Teacher Page**

**Software Profitability**

**Student Vocabulary**

Client – banks that are buying the software from Fiserv

Implementation – downloading the software on all the banks computer

Profit Gain – net profit/company cost

Net profit – Client Payment – company cost

ROI – Return on Investment, total profit/total cost to company

Sunset – retire or discontinue the software

**Optional Scaffolding Questions for Students**

Identify the irrelevant information.

How much money will it cost fiserv. to develop and implement the software?

How much money will fiserv. be paid by the clients?

What is fiserv.’s net gain?

**Solution:**

Total Cost to fiserv. – 

Total return from client - 

Net Gain – 

Percent Gain – 

Based on the company’s 25% ROI recommendation, you should sunset or retire the software.

**Follow up:**

Push students to change aspects of the problem to justify sending it to production.