



## Teaching Guide

For

# FedEx Dock Layout for Fork Lift Efficiency

**Illinois Transportation, Distribution and Logistics  
Math and Science Project**

2007

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## **Acknowledgements**

*We would like to recognize the following people for their contribution to this module:*

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## **Problem Solving Activity**

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## Scenario Focus

**Primary Career Pathway:** Warehousing and Distribution Center Operations

**Occupation/Job Titles Related to this Scenario:** Logistics Manager; Logistics Analyst; Distribution Manager; Transportation Manager; Warehouse Manager; Dock Managers, Fork Lift Operator, Load Operators, and Vender and Customer Relations Managers

**Recommended Teaching Subject Areas:** Logistics, Math, Industrial Technology and Communications

## Teacher/Writer Information

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## Business/Industry/Government Partner

FedEx Freight, Incorporated

4711 Lawndale Avenue

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## Scenario Problem Statement

You received a memo from the Operations Manager. He wants you to minimize the distance that forklifts must travel to unload and load the shipments across this dock. He provides you with the information that you'll need to complete this problem on three pages:

1. **Layout** - an overhead view of the dock, there are 18 doors, they have been left blank so that you can decide which doors each trailer will be placed.
2. **Door Distances** - a matrix that tells you the distances from a numbered door to another numbered door on the layout.
3. **Trailer Data** - information about the 5 trailers you must load and the 5 trailers you must unload on this dock.

Given the trailer data, decide the door for each of the 5 load trailers and each of the 6 unload trailers. Remember, the goal is to place them in doors where the distance that forklifts travel to unload and load the freight is minimized. A solution is desired in an Excel spreadsheet which uses a formula/algorithm where the user can dynamically change door locations to determine the optimal distance for forklift travel.

Please be prepared to explain your spreadsheet and your findings in an oral presentation at our next Industrial Engineering Departmental Meeting.

### **TDL Cluster Knowledge and Skills and Performance Elements**

- Process incoming products including unloading, receiving, checking, marking/identification and transporting to storage pick up areas, work stations or outbound staging areas and storing products for order-picking.
  - Determine scheduled volume and flow of incoming products for day/week.
  - Determine equipment and staffing requirements and develop traffic management and work schedules.
- Process outbound shipments including order-picking, sorting and checking; packaging, sealing, weighing, and manifesting; and loading and load balancing and shipping.
  - Determine scheduled volume and flow of outbound products for day/week.
  - Determine equipment and staffing requirements and develop traffic management and work schedules.

### **Illinois Learning Standards:**

#### **Math**

- Select units and scales that are appropriate for problem situations (I.7A.1)
- Solve problems involving scale drawings, models, maps, or blueprints. (H.7C.1)
- Construct, read, interpret, infer, predict, draw conclusions and evaluate data from various displays including histograms and scatter plots. (H.10A.1)
- Solve problems involving multiple rates, measures, and conversions (I.7C.7)
- Apply formulas in a wide variety of theoretical and practical correlated against real work measurements.

#### **Language Arts**

- Interpret and explain design tables, graphs and skid routes in conjunction with related assignment.
- Communicate information and ideas in narrative informative and persuasive writing with clarity and effectiveness.
- Deliver planned oral presentations. (4.B.3a)

#### **COMPUTER SKILLS:**

- Use of a word processing program
- Use of Power Point Presentation
- Use of Excel functions and layouts

What I Want Students to Know	What I Want Students to be Able to Do
<ul style="list-style-type: none"> <li>• Define logistics and distribution.</li> <li>• Understand the role of logistics and distribution in retail industry.</li> <li>• Relationship of cost of distribution to Customer Service</li> <li>• Career Opportunities in logistics and distribution</li> <li>• Major types of distribution channels</li> <li>• Major costs of distributions</li> <li>• Understand the factors of a simple and complex routing for moving products (skids) from the In to the Out truck.</li> <li>• How the skid problems applies to more complex situations</li> </ul>	<ul style="list-style-type: none"> <li>• Determine most appropriate type of movement for specific products</li> <li>• Calculate cost of movement for specific skids from in and out procedures</li> <li>• Calculate cost of moving skids at distribution center for rapid in and out transfer</li> <li>• Plan routes between two or more skid destinations</li> <li>• Write a business report</li> <li>• Make a presentation and oral report with visuals and related flow charts</li> </ul>

**Objectives:**

- Define and discuss the general components of transportation, distribution and logistics.
- Define, explain, and apply the multiple types of transportation carriers within the field of TDL.
- Interpret and analyze information from a problem situation using various data types.
- Use spreadsheet software to develop an algorithm to effectively solve a real world TDL problem.
- Deliver an oral presentation of their spreadsheet solution using visuals and other presentation aids.

**Measurement Criteria for an acceptable solution:**

1. Location of IN and Out Bound trucks represented the most cost effective means for transfer of skids on schedule to be determined
2. Identified on transfer routes between in bound truck and out bound truck and clearly mark each skid to the location of Out bound trucks.
3. Evaluate alternative locations of In and Out bound trucks and modes of transfer and cost differences. Cost labor, fuel and time.
4. All calculations were correct using formulas and charts new procedures provided.
5. Presentation to be presented with power point, Excel and other visual aids and/or handouts.
6. The presentation met the 7 requirements of effective business presentations:

- Evidence of preparedness and practice
- Started on time
- Dressed appropriately
- Showed enthusiasm and confidence
- Maintained eye contact, showed friendliness and respect
- Speak slowly and distinctively without grammatical errors, colloquialism or slang
- Encourage questions, repeat the question and answer only the questions asked completely; accepted reactions without being defensive. Smile.

### **Teacher Notes:**

Students should have a good working knowledge of math and formulas. The students should be able to transform a word problem into a math formula and solve the problem. Additional content on transportation modes or routing, writing reports and making presentations may be necessary for all students. This can be done congruently with the scenario or prior to working on the scenario. Resources used for this problem are listed in the Appendix.

Please review the materials needed prior to starting the problem solving activity so that each student can make a set of copies or obtain items needed to have a working model for future reference. Notify students of the date that presentations will be made. Give students the opportunity to make their own cause and effect connections as various consequences present it.

Use discretion in providing FedEx Trucking contact information. The only contact any employees you have been given at the company permission are to be contacted by the student. This is on a need to know basis. Direct students to the company website for basic information.

**Time Required to Complete Problem:** 8 hours

### **Types of Materials included in this Module:**

1. Lesson plans for each topic with discussion questions and student activities.
2. Copy of student handouts with activities for duplication.
3. Copy of material describing problem for students.
4. Evaluation with measurement criteria and scoring guide.
5. Teacher materials to assist in evaluation of problem and possible solution steps.
6. Glossary of terms related to this module.
7. PowerPoint Presentation, Rules for PowerPoint Presentations for teacher to use in Lesson 4.

8. PowerPoint Presentation of Possible Student Solution with an Excel Worksheet and a Student Handout.

**Support Materials and Resources Necessary for Completion of Scenario:**

- Computer access to internet and with word processing, spreadsheet, and presentation software
- Handouts (see each lesson)
- Websites (see each lesson)
- Supplies for Table Top Activity (Lesson 2)

# Lesson 1

<b>TOPIC</b>	<b>Overview of Transportation, Distribution, and Logistics</b>	<b>TIME ESTIMATE</b>	1 hour
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<b>OBJECTIVES</b>	
<ul style="list-style-type: none"> <li>Students will be able to define and discuss the general components of transportation, distribution and logistics (TDL).</li> </ul>	

<b>MATERIALS &amp; RESOURCES</b>	
<ul style="list-style-type: none"> <li>Handout #1, Defining Logistics</li> <li>Website: <a href="http://www.wikipedia.org">www.wikipedia.org</a></li> </ul>	

<b>LESSON DESCRIPTION &amp; ACTIVITIES</b>		
<b>Steps</b>	<b>No. of Minutes</b>	<b>ACTIVITIES</b>
1	5	<ul style="list-style-type: none"> <li>Ask students to write a journal entry on the topic of "What does Logistics mean to you?"</li> <li>Have students discuss their answers.</li> </ul>
2	30	<ul style="list-style-type: none"> <li>Distribute Handout 1, Defining Logistics.</li> <li>After students have reviewed the readings,               <ul style="list-style-type: none"> <li>Ask students to define logistics and its components.</li> <li>Ask students to distinguish between material management and physical distribution management.</li> <li>Ask them to explain why physical distribution is the major priority for retail companies and how it relates to industrial firms.</li> </ul> </li> <li>Have student's research transportation or transport to obtain a definition. Suggested website: <a href="http://www.wikipedia.org">www.wikipedia.org</a></li> <li>Lead a class discussion on the following questions:               <ol style="list-style-type: none"> <li>How do products that you buy at your store get to you? How do raw products get to the manufacturer? How do the finished products or merchandise get to your store?                   <ul style="list-style-type: none"> <li><i>Examples: Fresh meat, produce, canned goods</i></li> <li><i>Examples: Clothing, automobiles, computers</i></li> <li><i>Compare food industry to industrial products</i></li> </ul> </li> </ol> </li> </ul>



		<ul style="list-style-type: none"> <li>• <i>Have students draw a flow diagram of a product based on Figure 1.1 with the handout.</i></li> </ul> <p>2. What are some of the major decisions that have to be made in getting the finished products to your store?</p> <ul style="list-style-type: none"> <li>• <i>Where will the product be produced for distribution?</i></li> <li>• <i>How will products be distributed to consumers?</i></li> <li>• <i>How will we ship the products—trucks, rail?</i></li> </ul>
3	10	<ul style="list-style-type: none"> <li>• Allow time for students to complete the <b>Activity</b> on page 2 of Handout 1.</li> <li>• Discuss their responses.</li> </ul>

## Defining Logistics

### What is logistics?

Logistics refers to the planning and management of the physical movement or distribution of products and merchandise from the producer to the consumer.

Producers are the companies who make the product. Consumers are people who use the product.



Logistics and distribution plays a critical role in the economy because products are usually produced in one part of the country or the world and have to be transported many miles to where consumers live. Producers and consumers depend on logistics and distribution companies and professionals to get products to the right place at the right time when consumers want to buy them. This can be very costly without good planning and management.

When defining logistics remember the 7 R Principle: Logistics is delivering the **right** product, in the **right** quantity and the **right** condition at the **right** place, at the **right** time, for the **right** customer, at the **right** cost.

As shown in Figure 1.1, logistics management can be divided into two separate activities. Materials management involves the bringing of raw materials and supplies to where they are used to produce products and merchandise, usually a manufacturing company, and moving them through the company until they become finished products. Materials management is often referred to Inbound Logistics

Physical distribution management involves the movement of finished products and merchandise from the end of the production line to the consumer. This is also called Outbound Logistics.

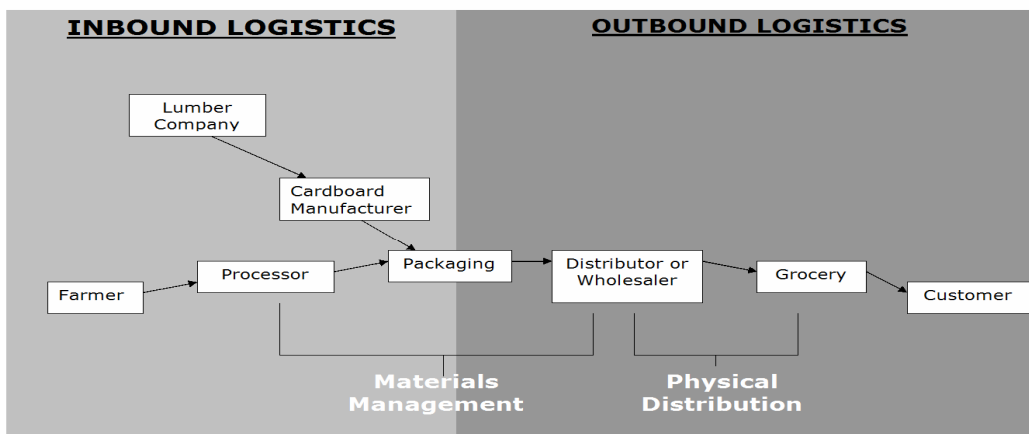


Logistics and distribution professionals working for retail companies are involved in physical distribution activities. They are responsible for getting products and merchandise from the manufacturers or their wholesalers to stores and consumers.

## Components of Logistics:

Transportation, Distribution, Supply Chain Management, Global Positioning Systems, Shipping and Receiving Dock Management, Internal materials handling, packing, labeling, vendor relations.

Figure 1.1 Flow Chart for Defining Logistics and Distribution



## Activity #1

Discuss with your group the following and write your answers on a separate sheet of paper:

1. List the 7 R's in the 7R Principle.
2. How do products that you buy get to you? How do raw materials get to the manufacturer? How do the finished products or merchandise get to the ultimate user?
3. What are some of the major decisions that have to be made in getting the finished product to the ultimate user?
4. What positions are available on the general areas of logistics?
5. What training and education will you need to enter the growing field of logistics?

# Lesson 2

<b>TOPIC</b>	Introduction to Transportation Carriers	<b>TIME ESTIMATE</b>	2 hours
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<b>OBJECTIVES</b>
<ul style="list-style-type: none"> <li>• Students will be able to define and explain the multiple types of transportation carriers within the field of TDL.</li> <li>• Students can explain the relationships between the problem statement and carriers.</li> </ul>

<b>MATERIALS &amp; RESOURCES</b>
<ul style="list-style-type: none"> <li>• Handout #2, Memo from FedEx Freight with data</li> <li>• Handout #3, Analyzing a Logistics and Distribution Problem</li> <li>• Handout #4, Modes of Transportation</li> <li>• <b>Tabletop Module Materials:</b> Model of Shipping/Receiving dock with small objects to move, cards on colored paper to represent truck and fork lifts, and other elements to visualize problem.</li> </ul>

<b>LESSON DESCRIPTION &amp; ACTIVITIES</b>		
<b>Steps</b>	<b>No. of Minutes</b>	<b>ACTIVITIES</b>
1	20	<ul style="list-style-type: none"> <li>- Distribute Handout 2, the memo from FedEx.</li> <li>- Have students read.</li> <li>- Discuss any questions they might have about the assignment.</li> </ul>
2	20	<ul style="list-style-type: none"> <li>- Distribute Handout 3, Analyzing a Logistics and Distribution Problem.</li> <li>- Have students complete a What I know/What I don't know worksheet for the FedEx problem.</li> </ul>
3	30	<ul style="list-style-type: none"> <li>- Distribute Handout 4, Modes of Transportation.</li> <li>- Discuss the different types of ground carriers.</li> <li>- Have students work in groups to complete the classroom activity at the end of Handout 4.</li> <li>- Have groups share their responses.</li> </ul>

4	40	<b>Table Top Activity:</b> Divide students into groups. Have students make a plan of the loading docks using desks and construction paper. The students will make a dock layout using black construction paper and white chalk to draw on the docks. Have students use labeled index cards to represent trucks and have them station cards in the different docks. Then students will act out the problem and find plausible solutions for it. Each group will be required to come up with three possible solutions and present the best solution to the class.
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# FedEx Freight

4711 Lawndale Avenue  
Lyons, IL 60543

## Interoffice Memorandum

**To:** TDL Consultant

**From:** Joel Brock  
Operations Manager

As you know, our distribution center in Lyons, IL is our regional hub for all of our retail electronics clients of Best Buy and Circuit City. We recently acquired Tweeter as our third retail electronics supplier. Due to the addition of the Tweeter account, we need to position a new dock configuration for the shipping and receiving of trailers into the loading area of our distribution center.

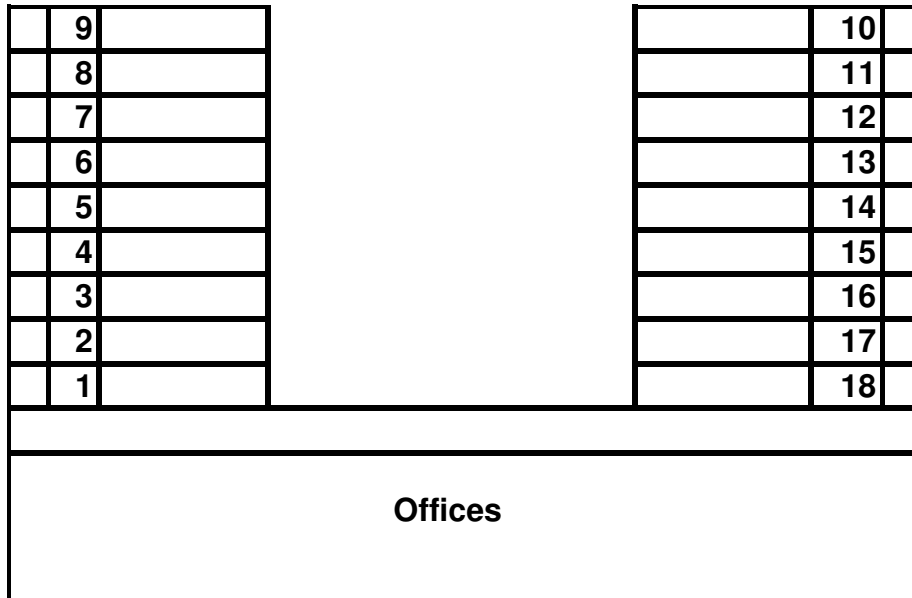
Your goal is to minimize the distance that forklifts must travel to unload and load the shipments across this dock. There are attached pages with the information that you'll need to complete this problem:

1. **Layout (Figure A)** – an overhead view of the dock, there are 18 doors, they have been left blank so that you can decide which doors each trailer will be placed.
2. **Door Distances (Figure B)** – a matrix that tells you the distances from a numbered door to another numbered door on the layout.
3. **Trailer Data (Figure C)** – information about the 5 trailers you must load and the 5 trailers you must unload on this dock.

Given the trailer data, decide the door for each of the 5 load trailers and each of the 6 unload trailers. Remember, the goal is to place them in doors where the distance that forklifts travel to unload and load the freight is minimized. A solution is desired in an Excel spreadsheet which uses a formula/algorithm where the user can dynamically change door locations to determine the optimal distance for forklift travel.

Please be prepared to explain your spreadsheet and your findings in an oral presentation at our next Operations Meeting.

**Figure A: Dock Layout**



**Figure B: Trailer Data Worksheet**

***Loads***

- Load 1            Receives an average of 16 shipments daily.
- Load 2            Receives an average of 12 shipments daily.
- Load 3            Receives an average of 21 shipments daily.
- Load 4            Receives an average of 10 shipments daily.
- Load 5            Receives an average of 19 shipments daily.

***Unloads***

	Load 1	Load 2	Load 3	Load 4	Load 5	Total
Unload 1	2	3	4	3	4	16
Unload 2	3	3	2	1	2	11
Unload 3	8	0	1	1	5	15
Unload 4	0	2	5	3	2	12
Unload 5	1	0	6	1	4	12
Unload 6	2	4	3	1	2	12
	16	12	21	10	19	78

**Figure C: Distance Between Doors (in ft.)**

	From																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	41.5	53	64.5	76	87.5	99	110.5	122	152	140.5	129	117.5	106	94.5	83	71.5	60
2	41.5	0	41.5	53	64.5	76	87.5	99	110.5	140.5	129	117.5	106	94.5	83	71.5	60	71.5
3	53	41.5	0	41.5	53	64.5	76	87.5	99	129	117.5	106	94.5	83	71.5	60	71.5	83
4	64.5	53	41.5	0	41.5	53	64.5	76	87.5	117.5	106	94.5	83	71.5	60	71.5	83	94.5
5	76	64.5	53	41.5	0	41.5	53	64.5	76	106	94.5	83	71.5	60	71.5	83	94.5	106
6	87.5	76	64.5	53	41.5	0	41.5	53	64.5	94.5	83	71.5	60	71.5	83	94.5	106	117.5
7	99	87.5	76	64.5	53	41.5	0	41.5	53	83	71.5	60	71.5	83	94.5	106	117.5	129
8	110.5	99	87.5	76	64.5	53	41.5	0	41.5	71.5	60	71.5	83	94.5	106	117.5	129	140.5
9	122	110.5	99	87.5	76	64.5	53	41.5	0	60	71.5	83	94.5	106	117.5	129	140.5	152
10	152	140.5	129	117.5	106	94.5	83	71.5	60	0	41.5	53	64.5	76	87.5	99	110.5	122
11	140.5	129	117.5	106	94.5	83	71.5	60	71.5	41.5	0	41.5	53	64.5	76	87.5	99	110.5
12	129	117.5	106	94.5	83	71.5	60	71.5	83	53	41.5	0	41.5	53	64.5	76	87.5	99
13	117.5	106	94.5	83	71.5	60	71.5	83	94.5	64.5	53	41.5	0	41.5	53	64.5	76	87.5
14	106	94.5	83	71.5	60	71.5	83	94.5	106	76	64.5	53	41.5	0	41.5	53	64.5	76
15	94.5	83	71.5	60	71.5	83	94.5	106	117.5	87.5	76	64.5	53	41.5	0	41.5	53	64.5
16	83	71.5	60	71.5	83	94.5	106	117.5	129	99	87.5	76	64.5	53	41.5	0	41.5	53
17	71.5	60	71.5	83	94.5	106	117.5	129	140.5	110.5	99	87.5	76	64.5	53	41.5	0	41.5
To 18	60	71.5	83	94.5	106	117.5	129	140.5	152	122	110.5	99	87.5	76	64.5	53	41.5	0

\*\* The grid above contains the travel distance between each of the doors.



## Analyzing a Logistics and Distribution Problem

Your teacher will hand out a short description of the FedEx logistics and distribution problem. You should analyze the problem and develop questions to ask a company representative.

### Tips for Analyzing Problem Statements

Here are some tips in analyzing the problem.

- Read the problem statement very carefully. Read the statement sentence by sentence.
- Don't assume anything. Make sure that you can back up any assumption or conclusion about the problem by what is stated in writing.
- Don't be concerned if you do not have all the information you need. You can get more information at the site tour and by asking a representative of FedEx and your teacher for the information you think you need to solve the problem.
- Don't be concerned that you do not know how to develop a distribution plan. Your teacher can help you learn how to develop these types of plans.
- Don't be afraid to ask questions and tell people what you need to know. Good problem-solvers are people who are not afraid to learn new things and ask for assistance.

### Determining What You Know and What You Don't Know

Expert problem-solvers start their analysis of a problem by writing down what they already know and what they need to know to solve the problem. Once they identify what they don't know, they then develop questions and seek out people who can answer their questions and help them solve the problem.

As shown in Figure 1.2, one way to do this is to make a list using a two-column sheet of paper with one column for what you know and one column for what you don't know. For example, under the column for what you know, you could write down, "The plan is due in four weeks."

## **ACTIVITY**

With your group, develop the questions you will ask the company representative by doing the following:

1. Read the problem statement and make a list of what you know and what you don't know. Use Figure 1.2 to write down your group's list.
2. Look at your list of what you don't know and develop questions that you can ask.

**Figure 1.2**  
**Problem Analysis Work Sheet**

<b>What I Know</b>	<b>What I Don't Know (Need to Ask)</b>

## Modes of Transportation

Transport or transportation is the movement of people and goods from one place to another. In the world of transportation, distribution, and logistics there are five main modes used for the transportation of goods. They are listed below:

**Air** - Transport of passengers and goods in aircraft.

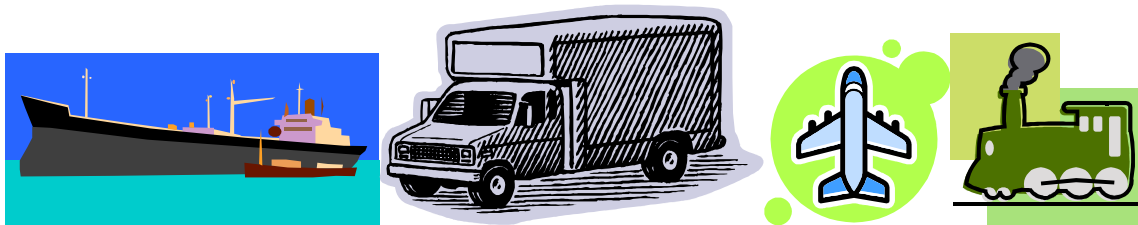
**Railroad** - Transport of passengers and goods along railways or railroads.

**Ground** - Transport that covers all the methods of moving people and goods using roads and highways.

**Water** - Ship transport is the process of moving people and goods by barge, boat, ship or sailboat over any body of water.

**Pipeline** - Transport of goods through a pipe. Most commonly, liquid and gases are sent.

**Intermodal** - Involves the use of more than one form of transport for a journey.



FedEx Freight uses ground as the main mode of transportation for its clients. Within the trucking category of TDL, there are three major classifications: less-than-truckload (LTL), truckload (TL), and parcel carriers. The next page breaks down each classification.

## The Three Major Types of Ground Transportation

### Truckload (TL)

As the name implies, a truckload carrier is one that moves single shipments, which fill-out the capacity of a trailer. They pick-up the freight at one particular shipper and deliver that freight to one particular customer. Typically, if a shipment weights in excess of 36,000 pounds, then it qualifies as a truckload, whether or the not the trailer is full.

### Less-Than-Truckload (LTL)

This is the most typical type of truck shipping. Most of the "household name" trucking companies are LTL carriers. The LTL carrier picks-up an assortment of small shipments from a number of different shippers over the course of a day's pick-up schedule. At the end of the day, the hopefully full truck returns to the local terminal, the freight is sorted, based upon destination, and reloaded on other trucks headed for that direction. Along the way, the truck may make two or three additional stops.

### Parcel Carriers

Parcel carriers usually handle small packages and freight that can be broken down in to units less than 150 US pounds. The United States Postal Service, UPS, FedEx, and DHL are examples of parcel carriers.

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### Classroom Activity:

In your groups, discuss the following ground transportation scenarios and select the most efficient means of ground transportation.

- 1) Buying a pair of shoes from eastbay.com or the Eastbay magazine.
- 2) Shipping 25 pallets of a new movie release from the manufacturer to a Best Buy Distribution Center
- 3) Shipping 100 Sony 62"plasma televisions from Sony to the Circuit City Distribution Center.

Each group is required to complete the following:

- A paragraph supporting your choices of ground transportation
- Recommendations for ground transportation companies in each category
- Approximate shipping cost in each scenario

## Lesson 3

<b>TOPIC</b>	Spreadsheet/Solution Development	<b>TIME ESTIMATE</b>	4 hours
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<b>OBJECTIVES</b>
<ul style="list-style-type: none"> <li>• Students will be able to interpret and analyze information from a problem situation using various data type.</li> <li>• Students will use data to develop a spreadsheet.</li> </ul>

<b>MATERIALS &amp; RESOURCES</b>
<ul style="list-style-type: none"> <li>• Computers with Microsoft Excel</li> </ul>

<b>LESSON DESCRIPTION &amp; ACTIVITIES</b>		
<b>Steps</b>	<b># of Min</b>	<b>ACTIVITIES</b>
1	15	<ul style="list-style-type: none"> <li>- Demonstrate spreadsheet examples and discuss various formatting structures for spreadsheets. This includes both layout and the necessary summation calculation command for solving the problem.</li> </ul>
2	35	<ul style="list-style-type: none"> <li>- Have students review the data they have available and brainstorm the necessary elements for their solution.</li> <li>- Allow time for them to begin building their own spreadsheet documents.</li> <li>- Have students discuss different formats with each other, e.g. sharing what works and what does not work.</li> </ul>
3	20	<ul style="list-style-type: none"> <li>- Select students to present their formats.</li> <li>- Lead short discussion on what was good or what could be improved about the formats chosen.</li> </ul>
4	60-90	<ul style="list-style-type: none"> <li>- Allow time for students to revise or change their spreadsheets as needed.</li> <li>- Have them work in groups to compare and contrast their spreadsheets and to determine the best spreadsheet to use.</li> <li>- Have students prepare their final spreadsheet and use the information to develop their solutions.</li> </ul>

5 optional	20	- Demonstrate examples of how to use higher level functions, including If-then statements and V-lookup commands.
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**\*\*Note:** The beginning of every class will be showing them examples of the various skills that they learn (layout, calculations, and higher level commands such as If-Then statement and V-lookup). Then, the students will work independently on the skill set towards making the solution. The last part of each class should be set summarizing what worked and what didn't work for the students. This allows for students to work at a differentiated pace. Just make sure a new skill is shown each day and allow for a few working days.

# Lesson 4

<b>TOPIC</b>	Oral Presentations	<b>TIME ESTIMATE</b>	2 hours
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<b>OBJECTIVES</b>
<ul style="list-style-type: none"> <li>• Prepare a Power Point presentation of their solution to the problem.</li> <li>• Deliver an oral presentation of their spreadsheet and the solution using visuals and other presentation aids.</li> </ul>

<b>MATERIALS &amp; RESOURCES</b>
<ul style="list-style-type: none"> <li>• Computers with PowerPoint and Excel</li> <li>• PowerPoint Presentation, Business Presentation Template</li> </ul>

<b>LESSON DESCRIPTION &amp; ACTIVITIES</b>		
<b>Steps</b>	<b>No. of Minutes</b>	<b>ACTIVITIES</b>
1	15	<ul style="list-style-type: none"> <li>- Share with students the requirements of an effective business presentation. May want to use PowerPoint Presentation provided with this module.</li> <li>- Review the requirements for the FedEx solution presentation.</li> </ul>
2	30-60	<ul style="list-style-type: none"> <li>- Allow time for students to work on their presentations of their solution.</li> </ul>
3	30-60	<ul style="list-style-type: none"> <li>- Have students give their presentations to the class.</li> </ul>

# **Teacher**

## **Assessment Materials**



# FINAL EVALUATION

## Problem Statement to be Solved:

You received a memo from the Operations Manager. He wants you to minimize the distance that forklifts must travel to unload and load the shipments across this dock. He provides you with the information that you'll need to complete this problem on three pages:

1. **Layout** - an overhead view of the dock, there are 18 doors, they have been left blank so that you can decide which doors each trailer will be placed.
2. **Door Distances** - a matrix that tells you the distances from a numbered door to another numbered door on the layout.
3. **Trailer Data** - information about the 5 trailers you must load and the 5 trailers you must unload on this dock.

Given the trailer data, decide the door for each of the 5 load trailers and each of the 6 unload trailers. Remember, the goal is to place them in doors where the distance that forklifts travel to unload and load the freight is minimized. A solution is desired in an Excel spreadsheet which uses a formula/algorithm where the user can dynamically change door locations to determine the optimal distance for forklift travel.

Please be prepared to explain your spreadsheet and your findings in an oral presentation at our next Industrial Engineering Departmental Meeting.

## Measurement Criteria that would describe an acceptable solution

1. Location of IN and Out Bound trucks represented the most cost effective means for transfer of skids on schedule to be determined
2. Identified on transfer routes between in bound truck and out bound truck and clearly mark each skid to the location of Out bound trucks.
3. Evaluate alternative locations of In and Out bound trucks and modes of transfer and cost differences. Cost labor, fuel and time.
4. All calculations were correct using formulas and charts new procedures provided.
5. Presentation to be presented with power point, Excel and other visual aids and/or handouts.
6. The presentation met the 7 requirements of effective business presentations:
  - Evidence of preparedness and practice
  - Started on time
  - Dressed appropriately
  - Showed enthusiasm and confidence
  - Maintained eye contact, showed friendliness and respect
  - Speak slowly and distinctively without grammatical errors, colloquialism or slang

- Encourage questions, repeat the question and answer only the questions asked completely; accepted reactions without being defensive. Smile.

### **Suggested Scoring Guide**

#### **1. Solving the Problem -- 20 points**

#### **2. Presentation – 25 points**

#### **3. Spreadsheet – 55 points**

- Appropriate formatting layout
- Accuracy of calculations
- Ability to use higher level Excel commands

### **Possible Solution:**

See: FedEx Possible Solution PowerPoint file  
FedEx Solution Presentation Handout on next page  
FedEx Solution Excel Spreadsheet file

## FedEx Freight – Forklift Problem Proposed Solution

- The distribution center is **FedEx**.
- It is in **Lyons, IL**
- FedEx regional hub for all of our retail electronics clients of **Best Buy**, and **Circuit city**.
- The recently acquired **Tweeter as there third retail** electronics supplier.
- What we had to do is **position a new dock configuration** for the shipping and receiving into the loading area of our distribution center.
- Loads are the **trucks that receive**, which is going to the different **cities**.
- Unload are the **trucks that give**, which are the **stores**.
- The **goal** is to minimize the distance that the forklift must travel to unload and load the shipments across the dock.

### Option 1

	DISTANCE					TOTAL
	STL(16)	ORL(14)	N.Y.C.(6)	L.A.(13)	DEN(4)	
<b>B.BUY-A(5)</b>	166	180	166	214.5	166	892.5
<b>B.BUY-B(15)</b>	124.5	124.5	166	53	120	588
<b>C.CITY-A(3)</b>	480	0	64.5	94.5	207.5	846.5
<b>C.CITY-B(7)</b>	0	166	207.5	214.5	129	717
<b>TWEETER-A(12)</b>	76	0	429	41.5	378	924.5
<b>TWEETER-B(8)</b>	235	378	159	83	152	1007
					in (ft)	4975.5

DOCK #	DOCK LAYOUT	DOCK #
9		10
8	<b>TWEETER-B</b>	11
7	<b>C.CITY-B</b>	<b>TWEETER-A</b>
6	<b>N.Y.C.</b>	<b>L.A.</b>
5	<b>B.BUY-A</b>	<b>ORL</b>
4	<b>DEN</b>	<b>B.BUY-B</b>
3	<b>C.CITY-A</b>	<b>STL</b>
2		17
1		18

# APPENDIX

## **GLOSSARY of TERMS Related to this Scenario**

### **Distribution Center**

A warehouse that receives merchandise from multiple vendors and distributes it to multiple stores

### **Distribution channel**

The complete sequence of producers, wholesaler, and retailers involved in bringing a product from the producer to the consumers

### **Distribution costs**

The direct costs for handling and storing products at distribution centers and transporting products from manufacturers to stores and consumers

### **Forklift**

Warehouse vehicle used to lift heavy items

### **High levels of service**

A situation in which retail companies consistently have all of their products available in stores when customers want to buy them. High levels of service are measured by the percentage of products carried by a store that are in stock during a buying period (no stock outs).

### **Hub**

A common connection point for devices in a network

### **Layout**

Visual elements put into a pleasing and readable arrangement

### **Logistics**

The planning and management of the physical movement or distribution of products and merchandise from the producer to the consumer

### **Materials management (Inbound Logistics)**

The planning and management of the distribution of raw materials and supplies to where they are used to produce products and merchandise, usually a manufacturing facility, and moving them through the company until these materials become finished products.

**Pallet (Skid)**

The raised wooden platform on which books are delivered by binders and stored in distribution centers; handling requires the use of forklift trucks

**Physical distribution management (Outbound Logistics)**

The planning and management of the distribution of finished products and merchandise from manufacturers or their wholesalers to stores and consumers

**Producers**

Those companies that convert raw materials into products and merchandise to be distributed and sold to the consumer. Producers are usually manufacturing companies.

**Receiving Dock**

Location where a company receives shipments from suppliers; also the set of activities surrounding acknowledging the receipt of goods and transfer of ownership

**Shipping Dock**

The process of removing materials from stock and transporting them to a customer or other facility

**Trailer**

A freight-carrying, powerless truck trailer with one or more axles and constructed so that the front end rests upon a truck tractor