





Learning notes

For Teachers

For Students



Which lorry should a controller send?

Linked Articles: How Warehouses Work: a teen's guide to logistics Reshaping supply chains for a sustainable future

This task is a real-world example of analysis and problem solving that can be used to support a lesson on computational thinking skills. Logistics companies need to monitor and track their drivers' location to ensure the best use of the workforce in the geographical locations where the company operates. A logistics company may send drivers all over the country and outside of the UK when required.

The Task:

Using the information provided, decide which is the best lorry for Melanie to send to collect the medicines.

Background:

Melanie is a controller in a logistics company which collects and delivers medical supplies. Her job is to manage the company's lorries and drivers so they can complete collections and deliveries efficiently. To do this she will create a collection and delivery schedule at the start of each day for all the lorries and drivers. When creating the schedules Melanie must consider certain constraints about the number of hours drivers are permitted to drive. Melanie may schedule 2 drivers to a lorry to keep it moving, so one driver can rest while the other one drives.

During the day new collections and deliveries are received so Melanie has to adjust the schedules

of lorries and drivers. Melanie monitors the movement of lorries through trackers fitted to each lorry which she uses to help her decide which lorries to send to

new jobs. The trackers transmit the real-time location of the lorries to software on Melanie's computer.

Today, at 10:30am, Melanie receives an urgent request to collect some medicines from Nottingham in the next 2 hours. She now needs to decide which lorry to send.

Useful information:

- The new collection request is received at 10:30am.
- It is a priority job and needs to be collected in the next two hours from Nottingham.
- Each lorry cannot start a new job until it has completed its current job.
- Each lorry must complete all the jobs it has planned by the end of the day.
- There are 10 lorries currently driving across the country and each lorry has a tracker that has real-time information sent to the controller.

Driver Constraints

Each driver:

• can only drive for a maximum of 4

Ø

hours continuously before taking a break

- must have a break of at least 45 minutes after driving for 4 hours
- can work with another driver so one can have a break while the other drives
- can only drive a maximum of 48 hours a week

The lorry information in the table contains the following information for each lorry:

- start time
- number of drivers

- the destination of the current job
- distance of the current job destination from Nottingham
- driving time from the current job destination to Nottingham
- the current driving hours is how long the drivers have already been driving by 10:30am
- estimated completion time on current job
- planned jobs are the number of deliveries planned after the current job

Map showing the destination locations for each lorry on its current job



Lorry Information

Lorry 1	
Started work at	7:00am
Number of drivers	1
Current job destination	Birmingham
Distance to Nottingham	51 miles
Driving time to Nottingham	1hr 15mins
Current driving hours	3.5
Estimated current job completion time	10:45am
Planned jobs	2
Number of drivers	1

Lorry 3

Started work at	5:00am
Number of drivers	2
Current job destination	Plymouth
Distance to Nottingham	253 miles
Driving time to Nottingham	4hrs 14mins
Current driving hours	1.5 - 2nd driver
Estimated current job completion time	11:15am
Planned jobs	1

Lorry 5	
Started work at	6:30am
Number of drivers	1
Current job destination	Carlisle
Distance to Nottingham	187 miles
Driving time to Nottingham	3hrs 45mins
Current driving hours	4.0
Estimated current job completion time	10:30am
Planned jobs	1

Lorry 7

Started work at	6:30am
Number of drivers	1
Current job destination	London
Distance to Nottingham	127 miles
Driving time to Nottingham	2hrs 45mins
Current driving hours	4.0
Estimated current job completion time	11:30am
Planned jobs	1
Started work at	6:30am

Lorry 9	
Started work at	7:00am
Number of drivers	1
Current job destination	Dover
Distance to Nottingham	228 miles
Driving time to Nottingham	4hrs
Current driving hours	3.5
Estimated current job completion time	11:00am
Planned jobs	4
Started work at	7:00am
Number of drivers	1

Lorry 2 Started work at 6:00am Number of drivers 2 Current job destination London Distance to Nottingham 127 miles Driving time to Nottingham 2hrs 45mins 0.5 - 2nd driver Current driving hours Estimated current job completion time 11:30am Planned jobs 1 Number of drivers 2

Lorry 4	
Started work at	5:00am
Number of drivers	2
Current job destination	Aberdeen
Distance to Nottingham	415 miles
Driving time to Nottingham	7hrs 8mins
Current driving hours	1.5 - 2nd driver
Estimated current job completion time	10:45am
Planned jobs	1

Lorry 6	
Started work at	7:00am
Number of drivers	2
Current job destination	London
Distance to Nottingham	127 miles
Driving time to Nottingham	2hrs 45mins
Current driving hours	3.5
Estimated current job completion time	10:45am
Planned jobs	0

Lorry 8	
Started work at	6:30am
Number of drivers	1
Current job destination	Sheffield
Distance to Nottingham	41 miles
Driving time to Nottingham	1hr 15mins
Current driving hours	4.0
Estimated current job completion time	10:30am
Planned jobs	3
Started work at	6:30am

7:30am
2
Birmingham
51 miles
1hr 15mins
3.0
10:45am
1
7:30am
2





Use the table below to gather the information and help make and justify your decision.

Lorry	Start time	No. of drivers	Current job destination	Distance to Notts	Driving time to Notts	Current driving hours	Current job completion time	Planned jobs
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

You can find a solution sheet at: https://www.stem.org.uk/rxjhuz

Logistics activities from Generation Logistics

Download free STEM, careers and logistics activities:

Computing Collection:	https://www.stem.org.uk/cxjhuw
Mathematics Collection:	https://www.stem.org.uk/cxjhvc
Science Collection:	https://www.stem.org.uk/cxjje3
Careers Booklet:	https://www.stem.org.uk/rxjebg

Careers information from Generation Logistics:

www.generationlogistics.org

Generation Logistics Education Hub

Find further resources for teachers and careers leads at:

https://educationhub.generationlogistics.org/





What is the value of the contents in a lorry?

Linked Article: Leading Innovation and Sustainability in Logistics

This task is a real-world example of how spreadsheets can be utilised effectively to simplify data handling and calculation tasks.

Logistics companies need to know the contents of a lorry to ensure that all the contents arrive at their destination and are in the same condition as when they started their journey. Logistics companies also need to know the value of the contents in a lorry.

This is because they need to insure the lorry contents so may include a fee for the value of the goods being transported in their overall charge to customers to cover this insurance cost. The overall charge for transporting goods will cover additional factors such as the distance the goods are transported, the mass and size of the goods.

Background:

You work for a logistics company, Dynamic, and your role is to ensure there is a list of all the contents being transported in each of the company's lorries and the total value of the contents in a lorry. Each lorry carries different types and numbers of items so the value of each lorry's contents will be different. The value of the contents of the lorry needs to be calculated because Dynamic adds a fee, equal to 15% of the value of the contents of a lorry, to its overall transportation charges to cover the cost of insurance for the contents whilst they are being transported. The more valuable the contents in a lorry, the higher this additional fee.

A technology company, TEX4U, has asked Dynamic to transport some electronic goods from TEX4U's factory to a warehouse. TEX4U have emailed a list of the items they would like transported. The data includes:

- the number of each item
- the individual item value

The Task:

Using the information provided, create a spreadsheet to calculate the data required.

- Calculate the total value of each item type using the quantity and individual item value
- Set the format of the cells to currency where appropriate
- Use conditional formatting to highlight items with total value:
- Greater than £30,000 set the cell to yellow
- Greater than £50,000 set the cell to red
- Calculate the overall total value of the contents of the lorry
- Calculate 15% of the total value of the lorry to be added to the overall transportation charge
- Create a pie chart showing the quantity of

each item type on the lorry

• Create a bar chart showing the total value for each item type

Information provided to Dynamic by TEX4U

Item type	Quantity	Individual item value	Total Value
Laptop	16	799	
Desktop Computer	12	899	
MAC Desktop Computer	5	1349	
Mobile phone	63	699	
Monitor	8	109	
Gaming chair	4	549	
VR	18	459	
Game console - PS5	85	389	
Game console - switch	136	259	
Game console - xbox series x	90	479	
Tablet - Android	55	599	
Tablet - iPad	55	999	
All these items will fit in one lorry. There will be no other items in this lorry.		Lorry Total Value	
		15% Charge	

You can find a solution sheet at: https://www.stem.org.uk/rxjhuz

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Mathematics Collection: https://www.stem.org.uk/cxjhvc

Science Collection: https://www.stem.org.uk/cxjje3

Careers Booklet: https://www.stem.org.uk/rxjebg

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Technical roles within logistics

Linked Article: All articles

Logistics are a key aspect to our daily lives, and behind every order that is placed are the people dedicated to getting our products delivered to us.

There are lots of jobs and roles within the logistics industry. Here are five technical roles that can help inspire young people to find their perfect career.

Logistics Technician

Role: Manages the systems and software involved in processing commercial orders as well as fulfilling delivery requests.

Useful skills: Critical thinking, communicating complex ideas, technologically minded, problem solving.

Average annual salary: £30,000+

Suggested career pathways:

- An apprenticeship as a <u>Transport and</u> <u>Warehouse Operations Supervisor</u> after finishing school or college
- You could start your career with a lower level apprenticeship as an <u>Express</u> <u>Delivery Sortation Hub Operative</u> after finishing your GCSEs

Find out how this role makes a difference: <u>Technicians: Logistics Technician</u>

Automation Engineering Technician

Role: Installing, testing and maintaining automated machines and robots on advanced production lines.

Useful skills: Instructing others, attention to detail, logical thinking, practical application.

Average annual salary: £39,000+

Suggested career pathways:

- A T-level in <u>Maintenance, Installation and</u> <u>Repair for Engineering and Manufacturing</u> or a <u>T-level in Engineering,</u> <u>Manufacturing, Processing and Control</u> after your GCSEs.
- An apprenticeship in <u>automation and</u> <u>control engineering</u> after finishing school or college.
- A higher technical qualification after school or college or a more advanced engineering course, such as a <u>City &</u> <u>Guilds</u> or <u>BTEC</u> qualification.

Find out how this role makes a difference: <u>Technicians: Automaton Engineering Technician</u>

Building Systems Technician

Role: Designing energy management systems,



like heating and ventilation to create comfortable environments for people.

Useful skills: Attention to detail, decisive, logical thinking, practical application.

Average annual salary: £34,000+

Suggested career pathways:

- A T-level in <u>Building Services Engineering</u> <u>for Construction</u> after your GCSEs
- An apprenticeship as a <u>Building Energy</u> <u>Management Systems Control Engineer</u> after finishing your T-level or A-levels

Find out how this role makes a difference:

Technicians: Building Systems Technician

Data Technician

Role: Collecting, analysing and presenting data so it's easier to understand.

Average annual salary: £23,000+

Useful skills: Logical thinking, communicating complex ideas, precise, technologically minded.

Suggested career pathways:

- A T-level in **Digital Business Services** after you finish your GCSEs
- An apprenticeship as a **Data Technician** after finishing school or college

Find out how this role makes a difference: <u>Technicians: Data Technician</u>

Robotics Technician

Role: Building, programming, trouble-shooting and repairing robotic machines of all shapes and sizes.

Useful skills: Attention to detail, communicating complex ideas, precise, technologically minded.

Average annual salary: £30,000+

Suggested career pathways:

• A T-level in <u>Maintenance</u>, <u>Installation and</u> <u>Repair for Engineering Manufacturing</u>

- A T-level in <u>Maintenance, Installation and</u> <u>Repair for Engineering and Manufacturing</u> or <u>Engineering, Manufacturing, Processing</u> <u>and Control</u>
- An apprenticeship as an <u>Engineering</u> <u>Manufacturing Technician</u> after finishing your T-level or A-levels.

Find out how this role makes a difference: <u>Technicians: Robotics Technician</u>

The Task:

Use the information provided as a starting point:

- research technical roles and jobs available at the company's contributing to this edition of Catalyst magazine.
- use the <u>Generation Logistics</u> website to identify three technical roles that offer apprenticeships, noting the skills, average salary and the career pathways.
- identify three non-technical roles within logistics that are of interest, compare salaries, skills and career paths.

Compare the various roles:

- which of the roles you have learned about appeals to you the most?
- is there a role you would like to do but are concerned you may lack skills, qualifications, or opportunities to pursue the role?

How to achieve your career goal

- talk to the school careers lead, they are there to support your career choices and provide the information and advice you need
- contact local employers and ask if they offer job shadowing or work experience
- practice writing your CV and application letters
- keep exploring your options and find the career path and company perfect for you
- reach out to a STEM Ambassador for career advice





Powered by STEM Learning, Destination STEM aims to support young people in STEM careers.

This student orientated platform provides support, advice, guidance and opportunities to help young people explore pathways into STEM careers, develop skills and connect with STEM employers.

www.destinationstem.org.uk



STEM Ambassadors

Catalyst contributors are inspiring STEM role models, and you can meet people like them. Many are part of the STEM Ambassadors programme.

STEM Ambassadors are volunteers from industry and universities across the UK, who support young people and educators by providing talks, mentoring and engaging STEM activities.



Bring the power and inspiration of STEM Ambassadors to your classroom, free of charge.

Careers information from Generation Logistics

Further resources for teachers and careers

https://educationhub.generationlogistics.org/

Generation Logistics Education Hub

www.generationlogistics.org

leads.

www.stem.org.uk/stem-ambassadors

- Use the STEM Ambassador app (search STEM Teacher on your app store).
- Reach out to our STEM Ambassador Partners across the UK.
- www.stem.org.uk/about-us/our-network/sah

Further information

We hope you enjoy Catalyst Magazine, a science journal for young people aged 14-18 and their educators. Every edition has a supportive set of learning or teaching notes to enhance the educational experience to be gained from the content.

In addition to the current magazine, we have a large archive collection and a series of recorded webinars from contributors.

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