

# What is data science?



## Educator notes



### Learning objectives

- Classifying and categorising the key roles within data science
- Creating models to explain these roles in different contexts
- Evaluating the impact data science has on the world around us



### Curriculum links

- Maths
  - Solve problems
  - Reason mathematically
- Science
  - Scientific knowledge and conceptual understanding
  - Analysis and evaluation



### Time needed: 20 minutes

- Can be lengthened using extension option

This lesson enables students and teachers to gain insight into what data science actually is, how it is broken down and the impact it can have on our everyday lives.



### Equipment needed

- Scissors



### Resources required

- Data science card sort student sheet
- What is data science? presentation slides

## Contents

## Page

Introduction (5 mins)

2

Activity 1: Card sort (10 mins)

2

Activity 2: Linking data science to GSK (5 mins)

3

Activity 3: Create your own example - optional extension (10 mins)

3

# What is data science?



## Educator notes



### Slide 1 Introduction

- Introduce the lesson by explaining the lesson will be focusing on data science
- Data science is a broad and fast-moving field spanning maths and statistics, software engineering and communications.
- Explain to students that data scientists blend experience and knowledge from a wide range of fields and organisations, and continuously seek to expand their range of technical skills



### Slide 2 Read all about it

- Give pupils time to discuss the headlines on slide
- What do pupils think about these?
- The following slides will reveal a short news summary on each headline
- Explain that all this insight comes from a field called data science



### Slide 3 Police preempt where crimes will happen

- Explain to students that predictive crime mapping uses historical data on crime type, location, date and time to generate a hotspot map of where crime is most likely to happen
- Ask students to think about what we could use this data for? Possible answers include:
  - Researching crime rates in the local area when buying a house
  - Police could allocate more resources to that area if crime was particularly high



### Slide 4 The algorithm that can help you find love...

- Tell students that another example of data science in action is dating sites. Those looking for love simply need to answer a series of questions, then the algorithm does the work of searching through thousands of partners for your perfect match – all at the single push of a button
- Ask students if they can think any examples which would use a love-finding algorithm. Possible answers include:
  - Dating apps like e-Harmony
  - TV shows like First Dates
  - Compatibility tests



### Slide 5 Airline predicts flight delays ahead of schedule

- Explain to students that by collating data on weather, past delays and current information on flights, airlines can predict if a flight will be delayed before it has even taken off. This helps passengers plan their journey more efficiently, allowing for smoother travel
- Ask students to discuss what else airlines could do with this data - for instance, if a flight is consistently delayed, should they change the timetable?



### Slide 6 FedEx vans only turn left!

- From analysing journey histories, a huge amount of time is wasted whilst drivers wait for a gap in the road to turn right. Delivery times are significantly reduced when drivers turn left, as only one lane of traffic needs to be considered. Future routes are programmed to incorporate only left turns, reducing delivery times

# What is data science?



do more  
feel better  
live longer

## Educator notes



Slide 6

### FedEx vans only turn left! Continued...

- Ask students if they can think of other positive implications of this, for instance pollution caused by the vans would be reduced as they're spending less time on the road
- Discuss as a class and see if they can come up with any other innovative ways of using algorithms and data to solve a problem



Slide 7

### Card sort



Activity

### Card sort

10 mins

- Hand out the **Data science card sort student sheet**
- Students should read through the instructions, then cut out and sort the cards
- The answers can be found at the end of the educator notes



Slide 8

### Answers

- Run through answers on the board
- Ask students to consider the GSK examples they have put to one side
- Where do these fit? Reveal answers on **Slide 9** after students give suggestions



Slide 9

### Now it's your turn

- Can students create their own example to show how data science is used in a field of interest to them?
- Some ideas could be around:
  - Targeted adverts
  - Smart heating systems
  - Google maps
  - Pizza delivery
  - Policing
  - Self-driving cars
  - Weather forecasting

# What is data science?



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### Discussion and quiz

We've seen lots of advantages to data science, are there any disadvantages? Where does the data come from? Are there privacy issues to consider? Is there any negative impact of data science we need to consider?



### Extension/homework

Explain what data science is to someone at home, using an example to help you. Ask the person to write a short paragraph to explain what data science is (to check if you explained it well)

# What is data science?



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Type of data science	Description	Example	At GSK
Descriptive	<p>Helps to answer questions about what has happened.</p> <p>Collect a lot of data and gain essential insight into past performance.</p>	<p>Amazon looks at their deliveries over the past year.</p> <p>Where/when did deliveries not make it on time?</p>	<p><b>GSK example:</b> Look at millions of genes from people all over the world.</p> <p><b>What disease is common to many people?</b></p>
Diagnostic	<p>Helps to answer questions about why things happened.</p> <p>Take the findings from descriptive analytics and dig deeper to find the cause.</p> <p>Identify any anomalies in the data and explore trends to explain these anomalies.</p>	<p>During the Christmas period, there were more orders and not enough delivery trucks.</p>	<p><b>GSK example:</b> What is causing the disease in these people? What are the common factors?</p> <p><b>Are there any people who should have it but don't (anomalies)? What is causing them not to have it? This can help us find a successful treatment.</b></p>
Predictive	<p>Answer questions about what will happen in the future.</p> <p>Use historical data to identify trends and determine if they are likely to reoccur.</p>	<p>There will be an increase in orders over Christmas next year.</p> <p>Based on current trends, we will have even more customers making orders next Christmas.</p>	<p><b>GSK example:</b> We can predict the number of people that will be affected by this disease over the next 10 years.</p> <p><b>We can predict which areas of the planet will be most badly affected.</b></p>
Prescriptive	<p>Answer questions about what should be done.</p> <p>Using insight from predictive analysis, data driven decisions can be made.</p>	<p>On December 1<sup>st</sup> next year, we will increase the number of delivery trucks by 40%.</p>	<p><b>GSK example:</b> Targeting the new drug on 8000 people, starting in Western Europe.</p>