Applied Information and Communication Technology

Unit 3: The Knowledge Worker

18–22 May 2009

Time: 2 hours 30 minutes

Materials required for examination	Items included with question papers
Short treasury tag	Cover sheet
DVR_exam.xls	
Survey_exam.txt	

Instructions to Candidates

Complete your candidate details on the cover sheet provided.
At the end of the examination use a treasury tag to attach your printouts to Page 2 of the cover sheet in the correct order.

Information for Candidates

There are **five** activities in this examination totalling **88** marks. **2** further marks are allocated to Standard Ways of Working giving a paper total of **90** marks.
The marks for parts of the activities are shown in round brackets: e.g. **(4)**.
There are suggested timings against each activity: e.g. **(20 minutes)**.

Advice to Candidates

Read the Scenario carefully as it contains additional information.
Work through the activities in order.
Attempt **ALL** activities.
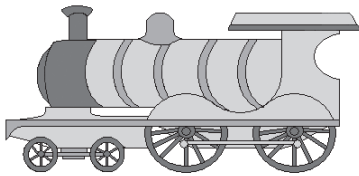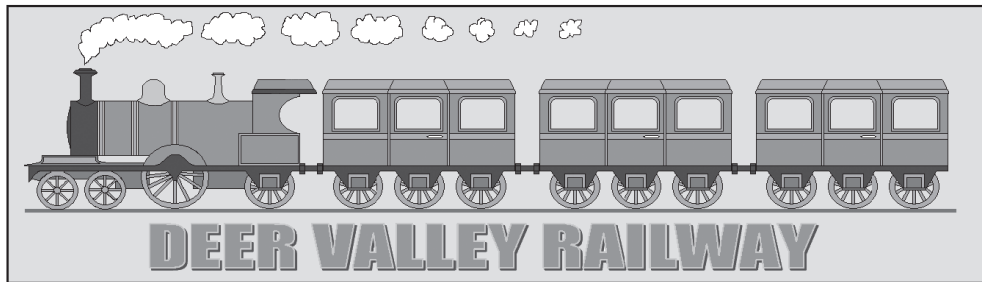Label your printouts clearly as instructed.
Printing must be undertaken within the examination time.

Turn over

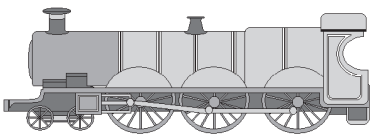**edexcel**
advancing learning, changing lives

DEER VALLEY RAILWAY
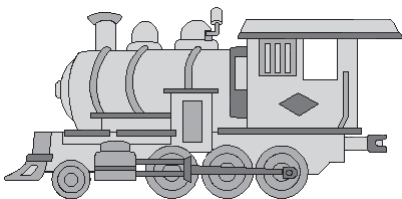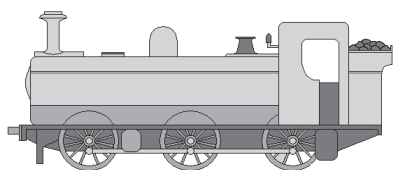
In the 1960s the government owned the entire rail network. At that time there was a movement of both passengers and freight away from rail and onto the road, which made some routes unprofitable. As a result a large number of railway lines were closed. The closures were mainly branch lines through rural areas where the number of passengers could not justify keeping the stations on those lines open.
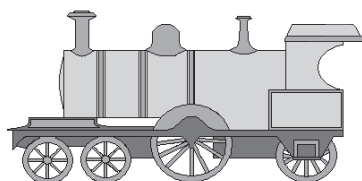
A number of these disused lines were bought by groups of steam train enthusiasts who restored the lines. They bought and restored old steam engines and passenger carriages and ran the lines as tourist attractions. One of these lines runs through the Surrey countryside and is known as the "Deer Valley Railway" because of the number of deer which can be seen around the area. The first line was opened in 1974 and was called the Daffodil line. A large number of volunteers ensured that the track was in good order, drove the trains, sold tickets and maintained the station buildings. By 1979 two other lines, the Tulip and Hyacinth lines, had opened. The Deer Valley Railway has been running as a very successful tourist attraction ever since.
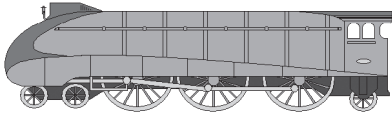
Recently a large number of housing developments have been built along the Daffodil line. Many residents of the developments have taken advantage of the Daffodil line because it links with a mainline service to London from Broughton Park. It was felt that a team of volunteers, no matter how dedicated, could not manage the increased number of passengers. Consequently, the "Deer Valley Railway Company" was set up and permanent employees now run the railway on commercial lines.

The company makes a good profit mainly based on the commuter traffic on the Daffodil line. The company has to run seven out of its nine trains on this line during the rush hours to cope with this traffic. These seven trains are kept in the engine sheds at Southwick overnight. They are all scheduled to go to Broughton Park during the morning peak period. The names of the engines are Duke of Wessex, Arrabella, Marquis of Granby, Charles Darwin, Delta, Caledonian Spirit and Lakeland Heights.

The company has found a number of problems with the current morning peak period timetable. Some of the trains are overcrowded whereas others are virtually empty. The company has employed you to advise on a new morning peak period timetable and has provided a partially completed model to help you.

The morning peak period is between 6 o'clock and 9 o'clock. In this period each train will run once from Southwick to Broughton Park, calling at all stations along the way. The trains have been timed between each station over the last three months.

The table shows the names of the stations and the mean time a train has taken to travel between stations.

Station	Mean time from previous station (format *hh:mm*)
Southwick	No previous station
Prestwell	00:10
Lower Marsden	00:20
Rottlesfield	00:10
Broughton Park	00:20

The company has undertaken a survey to provide data to help you. Each morning for one week, between 5 a.m. and 9 a.m., a team of employees asked **every** passenger using the Daffodil line three questions.

Which station are you travelling to?
Which station are you travelling from?
What time do you have to arrive at your destination station?

(Artwork Michelle Goates 2008)

Description of the model

The partially completed model will allow you to experiment with different train times and help you to provide a timetable which eliminates overcrowding on the trains.

Worksheet	Description
Timetable	The timetable worksheet allows you to set the times of the trains. Each train is listed and should be timetabled in the order they appear on the list. A dropdown box allows you to choose the time each train leaves Southwick. The remaining times are calculated by adding the mean time from the previous station to the time the train arrived at the previous station. Trains are allowed to leave Southwick at 0, 10, 20, 30, 40 and 50 minutes past the hour.
Survey Data	The survey data worksheet will contain the results of the survey and will be used to predict the number of passengers travelling on each of your trains at any given time.
Timings	This worksheet contains a matrix which calculates the length of time it takes to travel between each station. It is used to calculate the latest time a particular passenger needs to be at the station.
Passengers	This worksheet is important as it is where the number of passengers on each train at any particular time is calculated.
Station Worksheets	These are interim worksheets, one for each station, which are used to help calculate the number of passengers on each train at a particular time.

Some cells in the model are password protected. Should you wish to experiment with the model, the password is *edexcel*. Be aware that if you change the contents of any protected cell the model may not work.

Your Task

You have been asked to work out the morning peak time timetable for the Daffodil line on the Deer Valley Railway, minimising overcrowding. The morning peak time is between 6 a.m. and 9 a.m. Trains can leave at 0, 10, 20, 30, 40 and 50 minutes past the hour. There are seven trains, each of which runs once between Southwick and Broughton Park during the morning peak period. You need to choose the time that each train leaves Southwick. An overcrowded train is defined as one with more than 1500 passengers onboard.

The Data

The results of the survey have been analysed by an independent market research company. They have produced a table showing the predicted morning peak period journeys. These are to be found in the text file Survey_exam.txt.

All printouts MUST have a header and a footer. The header must contain the activity number. The footer must contain your name, candidate number and centre number.

Minimum font size of 10 should be used throughout.

All spreadsheet printouts should show gridlines and row and column headers.

For some of your spreadsheet printouts you may need to adjust column widths. To do this you will need to unprotect the worksheets. The password is *edexcel*.

Activity 1 – Understanding the situation (suggested time 20 minutes)

You should look at all the information available and make sure that you understand the situation.

On **one** sheet of A4 summarise the current situation by:

❑   listing key facts relevant to the problem you have to solve

❑   identifying any constraints

❑   outlining the decisions you have to make

❑   describing what would make a good solution

Save and print.

Note: Bullet pointed answers are acceptable.

(Total 13 marks)

Activity 2 – Sources of information (suggested time 20 minutes)

On **one** sheet of A4:

The 'Timings' worksheet will show how long it will take to travel between each station and it will use the data to calculate the time a particular journey will take.

❑ Describe how the data was obtained.

(3)

❑ List factors which may lead to inaccuracies in the journey times calculated in the model.

(4)

The text file Survey_exam.txt contains data about journeys made on the railway. The data will be used to predict the number of passengers on a train at any point in its journey.

❑ Describe how the data was obtained.

(4)

❑ Explain how the way the data was collected makes it fit for purpose (valid and useful).

(4)

 Save and print.

(Total 15 marks)

Activity 3 – Computer modelling (suggested time 50 minutes)

You should ensure that each printout is on **one** sheet of A4 only.

The model is stored as **DVR_exam.xls**.

❑ Open the spreadsheet model and familiarise yourself with it.

Importing Data

❑ Insert a new worksheet, rename it Survey Text and import Survey_exam.txt into it.

❑ Print off rows 1 to 20 of this worksheet showing the data. Remember to show gridlines and row and column headers.

(3)

Survey Data

❑ Using the data in your newly created 'Survey Text' worksheet, enter formulae into cells A8:F127 of the 'Survey Data' worksheet to read the data from your 'Survey Text' worksheet.

❑ Ensure the cells which show time are formatted *hh:mm:ss*.

❑ Print off columns A-F and rows 7-12 of the 'Survey Data' worksheet showing **formulae**.

(3)

❑ Print off columns C-H and rows 7-12 of the 'Survey Data' worksheet showing the **data**.

(5)

Passengers

❑ Enter a suitable formula into cell B16 of the 'Passengers' worksheet.

❑ Replicate this formula along to cell F16.

❑ Enter a suitable formula into cell F17.

❑ Print off columns A-F and rows 15-17 of the 'Passengers' worksheet showing **formulae**.

(5)

Timetable

❑ Enter the correct time intervals into cells C7-F7 of the 'Timetable' worksheet.

❑ Enter a formula into cell C10 of the 'Timetable' worksheet to calculate the time the first train will arrive at Prestwell.

❑ Replicate this formula into cells C10:F16.

❑ Ensure cells C10:F16 show times in the format *hh:mm:ss*.

❑ Print out columns C-F and rows 8-16 showing **formulae**.

(7)

Use the model to decide upon a suitable morning peak period timetable.

With your proposed solution displayed:

❑ Print off the 'Timetable' worksheet showing **data**.

(7)

❑ Print off the 'Passengers' worksheet showing **data**.

(5)

(Total 35 marks)

Activity 4 – Recommendations (suggested time 20 minutes)

Write a report for the management of the Deer Valley Railway Company, recommending a morning peak period timetable for the Daffodil line.

The report should include:

❑ A suitable title.

❑ An introduction explaining what the report is about.

❑ The recommended timetable.

❑ A justification of your timetable (backed up by information about the number of passengers on the trains at any time).

❑ Any other factors that may impact on the running of your timetable.

❑ At least one chart or graph.

❑ A concluding statement.

(15)

❑ Proof read your report to ensure that it is fit for purpose.

(3)

Save and print.

(Total 18 marks)

Activity 5 – Evaluation (suggested time 10 minutes)

Write an evaluation of the model considering:

❑ how well you thought it performed.

❑ what else you would like it to do and why this would help.

❑ what other data may be needed to improve the model and how you would collect this data.

Save and print.

(Total 7 marks)

(Standard ways of working: 2 marks)

TOTAL FOR PAPER: 90 MARKS

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