Paper Reference(s)

6953/01

Edexcel GCE

Applied Information and Communication Technology

Unit 3: The Knowledge Worker

14–18 January 2008

Time: 2 hours 30 minutes

Materials required for examination
Short treasury tag
BBG_exam.xls
manufacture_exam.txt
safety_exam.txt
survey_exam.txt

Items included with question papers
Cover sheet

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.
There are suggested timings against each activity: e.g. **(15 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.

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Scenario

Bronco Brian Gunn's Wild West Theme Park

Brian Gunn grew up in the fifties at the height of the Western films' popularity. Brought up on John Wayne films and television programmes like the Lone Ranger, he became fascinated by the Wild West. At the age of ten he joined the Billericay Wild West Club that boasted forty-five members. Brian's crowning moment was when he won the World Quick-Draw Tournament in 1976 after being National Champion for eight consecutive years.

Inevitably Brian's working life was going to be connected in some way with the Wild West. Consequently on leaving school he opened the first of his fast-food restaurants in Billericay. The "Bronco Brian's Burger & Beans Bars" chain of restaurants is now countrywide and has, over the years, netted Brian a fairly substantial fortune.

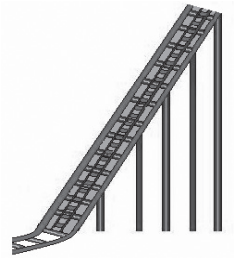
At the age of 60, having handed over the running of the restaurant chain to his son and daughter (Slim and Calamity), Brian turned his considerable expertise to building his dream. He started to build a Wild West theme park in Burnham on Crouch.

The feature ride of the theme park is going to be called Stampede. This will be a roller coaster ride through the Wild West. You have been asked to help design this ride and have been given a partially completed model to help you.

Features of the Stampede Ride

The Stampede ride can contain a number of different features. For safety purposes, however, its height is limited to 50 metres. It is not allowed to go below ground level and is completely driven by gravity after the Powered Climb. Passengers are seated in a 16-person cart for the ride.

Powered Climb



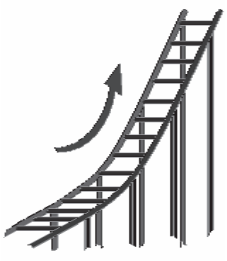
The first part of the ride will be a powered climb. The cart is linked to a chain which is driven by a powerful motor. This drives the cart up to the top of the Powered Climb where it is released by the chain and the cart starts its gravity driven ride. As you are only allowed **ONE** powered climb and this must be at the beginning of the ride it should take you to the **HIGHEST** point of the ride.

Vertical Drop

The Vertical Drop is exactly what it says, a vertical drop.

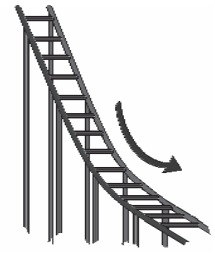
The people on the ride are facing forwards which gives the impression of falling face down. You can make the Vertical Drop as long as you want but be careful not to hit the ground.

Climb



The Climb is not a particularly thrilling part of the ride but one or two are necessary for the cart to regain height ready for the next thrilling feature. The track simply turns upwards.

Drop



The Drop is the opposite of a climb. The track simply turns downward. This feature is mainly used to build up speed. The ride will be dangerous if the cart doesn't gather enough speed to negotiate some features.

Zig-Zag

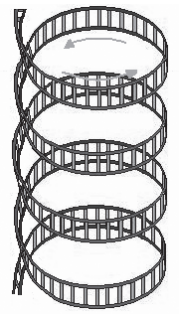
The Zig-Zag is a series of short drops and climbs in rapid succession. This feature requires enough speed to take you through all the climbs. The effect is meant to exert rapid vertical g-force changes. In other words it "leaves your stomach behind" several times in quick succession.

Loop

The Loop goes through a 360° turn with the passengers and cart upside down at the top.

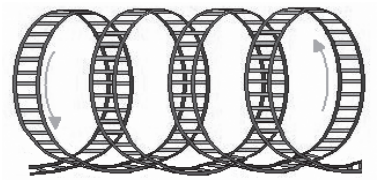
The cart needs a considerable amount of speed to complete this feature as it could be extremely dangerous if it stopped at the top.

Spiral



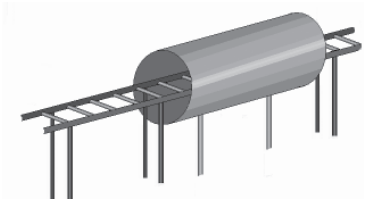
The Spiral is a series of sharp 360° turns, one after the other, going downwards. The effect of the feature is to make you feel as if you are being thrown sideways out of the cart. This cannot happen of course but considerable lateral g-force is felt.

Corkscrew



The Corkscrew is a cross between the Loop and the Spiral. It looks like a spiral on its side but turns the cart upside down several times in quick succession.

Tunnel



The Tunnel is a horizontal ride through a dark covered area. The height of the covered area is designed to be high enough to be safe but low enough to make the passengers think they have to duck.

Water Shoot

The Water Shoot is formed by a sharp drop followed by a horizontal ride through water.

(Source: Artwork by Michelle Goates, 2007)

Description of the model

The partially completed model allows you to try different combinations of features in the ride. When completed the model will tell you how much the ride will cost to build; whether it is a safe combination of features; and will give you an idea of its effectiveness by calculating a thrill factor.

Worksheet	Description
Results	The 'Results' worksheet is the main input sheet. The first feature in the ride will always be the Powered Climb but you will need to choose **nine** other features for your ride. Features may be repeated. The features named should be entered into the column headed 'Type'. You will also need to put in lengths for each of your features (including the Powered Climb). These are entered into the column headed 'Length'. This worksheet should also display the maximum speed, the cost of the ride and the thrill factor.
Attributes	The 'Attributes' worksheet contains information about each of the features. The first column contains the minimum length of the feature. You can have longer lengths but not shorter. You are alerted if the length of any feature is too short by a cell on the 'Results' and 'Stampede' worksheets turning red. There is a critical point in each feature where the cart is travelling at its fastest or its slowest. The model will need the estimated acceleration to and from this point. The ratio of the lengths before and after this point is given in the 'Slow or Fast point Factor'. The cost to build each feature and its thrill factor is listed. These figures will be supplied. Note that negative acceleration gives the rate of slowing down.
Stampede	This worksheet will calculate the results for various different configurations of the ride. It is the main calculation worksheet and will show if the ride is feasible and how much each feature costs. Much of this information is duplicated on the 'Results' worksheet but some is not.
Thrill Factor	This worksheet will contain the results of a survey taken at similar rides with similar features. The final column is a calculation to turn the results into a thrill factor.

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.

The Task

You have been asked to choose the configuration of the Stampede ride and present the findings to Brian Gunn. You have been given a budget (cost limit) of £130,000 and you will need to design the ride with the highest thrill factor within budget. In order to provide a thrill factor, a survey has been taken at several other theme parks. People were asked to rate each of the features for excitement by giving a number between 1 and 10, where 10 is 'extremely exciting' and 1 means 'not exciting at all'. The results of this survey are given in the text file "survey_exam.txt".

The model will also need acceleration values for the features before and after the fastest or slowest point. You have two sources for this. The first source is the manufacturer of the features. You will find this in the file "manufacturer_exam.txt". The second source has been compiled for you by one of your colleagues. It is an average of the readings from safety inspectors who measure the acceleration on similar rides by the same manufacturer. These values are held on the file "safety_exam.txt".

What you have to do

Read the remainder of the paper and then undertake the tasks in order. Each task has an estimated time limit. This is a guide only but may help you plan your work.

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 15 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
- ❑ Outline the decisions you have to make
- ❑ State any assumptions you are making.

Save and print.

(Total 13 marks)

Activity 2 – Sources of information (suggested time 15 minutes)

On **one** sheet of A4:

- ❑ Evaluate the two information sources of acceleration
- ❑ On the basis of your evaluation choose which source you are going to use. You must state **clearly** which source you are going to use
- ❑ Evaluate the survey of other rides as a source of information for the thrill factor, with regard to accuracy and relevance.

Save and print.

(Total 15 marks)

Activity 3 – Computer modelling (suggested time 50 minutes)

Open the spreadsheet model

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

- ❑ Open the spreadsheet model and familiarise yourself with it.

Importing Data

- ❑ Insert a new worksheet and import the survey data into it
- ❑ On **one** sheet of A4, print off this worksheet showing the data. Remember to show gridlines and row and column headers

Thrill Factor

- ❑ Using the data in your newly created worksheet, transfer the data into cells B3:U12 of the 'Thrill Factor' worksheet
- ❑ On **one** sheet of A4, print off columns A-D of the 'Thrill Factor' worksheet showing **formulae**.

Attributes

- ❑ Enter your stated choice (from activity 2) of 'Acceleration to Slow or Fast Point' data into cells C3: C12 of the 'Attributes' worksheet
- ❑ Enter your stated choice of 'Recovery Acceleration' data into cells E3:E12 of the 'Attributes' worksheet
- ❑ Enter a formula into cell G3 of the 'Attributes' worksheet to read the thrill factor for that ride from the 'Thrill Factor' worksheet.
- ❑ Replicate this formula down to cell G12
- ❑ On **one** sheet of A4, print off columns A to H of the 'Attributes' worksheet showing **formulae**.

Results

- ❑ Enter a suitable formula into cell F13 of the 'Results' worksheet to calculate the maximum speed the ride attains.
- ❑ Enter a suitable formula into cell I13 of the 'Results' worksheet to calculate the total cost of your ride.

The thrill factor is a whole number of marks calculated by rounding the total thrill factors for all your features and then adding 10 marks for every metre per second (m/s) the ride goes over 20 m/s at its fastest point.

- ❑ Enter a suitable formula into cell I14 of the 'Results' worksheet to calculate the thrill factor
- ❑ On **one** sheet of A4, print rows 13 to 14 and columns E to I of the 'Results' worksheet showing **formulae**.

Use the spreadsheet model to investigate different combinations of features with reference to cost and thrill factor.

With your proposed solution displayed:

- ❑ On **one** sheet of A4, print off the 'Result' worksheet showing data.

(Total 35 marks)

Activity 4 – Recommendations (suggested time 20 minutes)

Write a report for Brian Gunn, recommending your proposed solution to the design of the ride.

You should include:

- ❑ the alternatives you have considered
- ❑ the decisions you came to
- ❑ an explanation of why you made these decisions
- ❑ any other factors that Brian may need to take into account.

Use graphical information as well as textual information in your report.

Save and print.

(Total 18 marks)

Activity 5 – Evaluation (suggested time 10 minutes)

Write an evaluation considering:

- ❑ how well the spreadsheet model performed
- ❑ what else you would like it to do and why this would help
- ❑ what other data it may need and how you would collect it

Save and print.

(Total 7 marks)

(Standard Ways of working: 2 marks)
TOTAL FOR PAPER: 90 MARKS

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