

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCE

Applied Information and Communication Technology

Unit 3: The Knowledge Worker

COVER SHEET

20 – 24 May 2013

Paper Reference

6953/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Punch a hole in the top left corner of each printout.
- Ensure your printouts are in the correct order and attach them to page 2 of this cover sheet using a treasury tag.

Turn over ►

P41052A

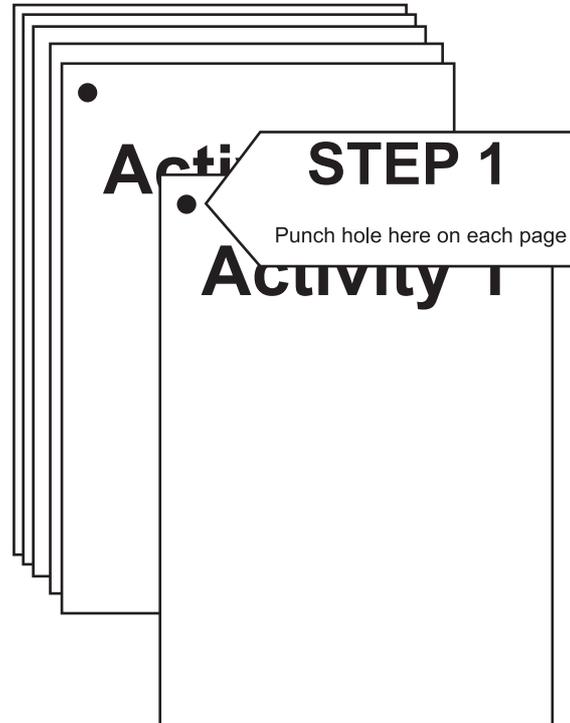
©2013 Pearson Education Ltd.

1/1/1/1/1/1



PEARSON

Put 'treasury tag'
through this hole



STEP 2 Arrange your pages in this order, face up.

Activity 1
Activity 2
Activity 3
Activity 4

STEP 3 Put a 'treasury tag' through all
your pages

STEP 4 (last)



FOR EXAMINER'S USE ONLY

SWW		
1		
2		
Total		

A1		
A2		
A3		
A4		
SWW		
Total		

Activity 1			
(a)	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
(b)	1		
	2		
	3		
	4		
	5		
Total			

Activity 2			
(a)	1		
	2		
(b)	1		
	2		
(c)	1		
	2		
(d)	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
(e)	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
(f)	1		
	2		
	3		
Total			

Activity 3			
(a)	1		
	2		
(b)	1		
	2		
	3		
	4		
	5		
(c)	1		
	2		
	3		
	4		
	5		
(d)	1		
	2		
	3		
	4		
(e)	1		
	2		
(f)	1		
	2		
(g)	1		
	2		
(h)	1		
	2		
	3		
	4		
(i)	1		
	2		
	3		
Total			

Activity 4		
MB1		
MB2		
MB3		
Total		



BLANK PAGE



Edexcel GCE

Applied Information and Communication Technology

Unit 3: The Knowledge Worker

20 – 24 May 2013

Time: 2 hours 30 minutes

Paper Reference

6953/01

You must have: Short treasury tag, cover sheet, Tour de Tournesol_exam.xls, RDistances_exam.txt, RHeight_exam.txt, OResults_exam.txt, Map_exam.pdf

Instructions

- Complete your candidate details on the cover sheet provided.
- All printouts must contain your name, candidate number, centre number and activity number.
- At the end of the examination:
 - all printouts should be placed in the correct order
 - use a treasury tag to attach your printouts (**as shown**) to page 2 of the cover sheet.

Information

- The total mark for this paper is **90**. There are **four** activities in this examination totalling 88 marks. **2** further marks are allocated to Standard Ways of Working.
- The marks for **each** question, within an activity, are shown in brackets
 - use this as a guide as to how much time to spend on each question.
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
 - you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

- Read through the Scenario carefully.
- 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 ►

P41052A

©2013 Pearson Education Ltd.

1/1/11/11/11/1



PEARSON

Scenario

Tour de Tournesol

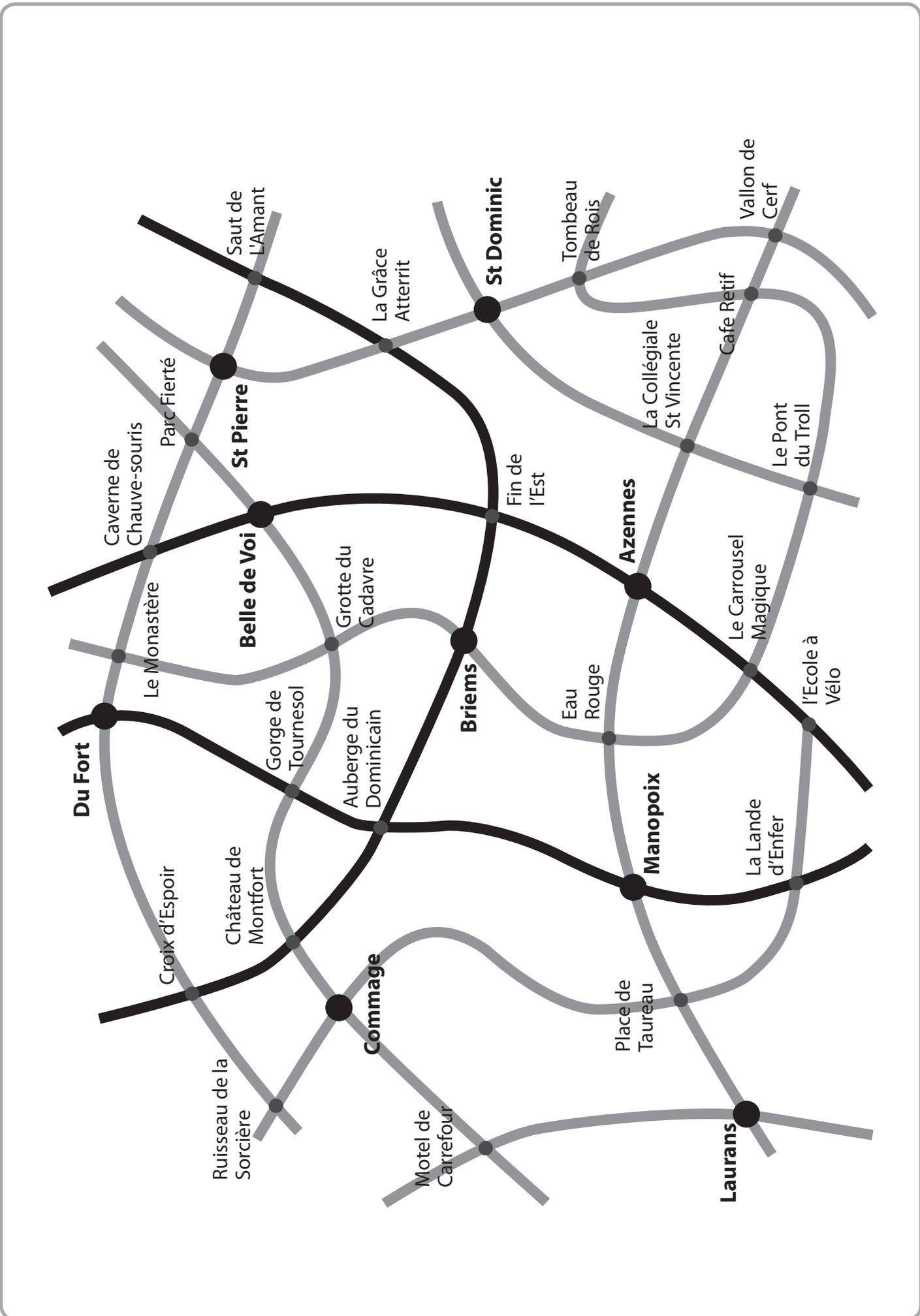
Sunflowers have become a popular crop in the Mannot district of southern France. They are easy to grow and harvest. Over the summer the flowers grow and in August they start to die. To harvest the crop the farmer brings in machinery, which cuts off the heads of the sunflowers and filters out the seeds. Fields of dead sunflowers with their heads bowed, waiting for decapitation, are a sad sight but for a few weeks in July the fields are a sea of yellow as thousands of sunflowers, tall and proud, turn their faces to the sun.

Always ready for a celebration, the nine towns in the area have traditionally marked this period with a cycle race. This is called the 'Tour de Tournesol'. The event starts on a Monday and ends with a huge party on the following Sunday. The race is supposed to be light-hearted but the fierce rivalry between the towns means that the outcome of the race carries considerable kudos for the winning town and competitors. Flying the 'Golden Sunflower' flag above the town hall, as the winning town, has become a matter of civic pride.

In most races, the person who completes the course in the shortest time wins. Cycle races such as the 'Tour de Tournesol' are a little more complex.

The overall champion is the cyclist whose aggregate times for the six stages (one stage every day from Monday to Saturday) is the shortest. There are three other competitions within the event. These are the Team Race, King of the Mountains, and the Sprint Cup. Care must be taken designing the course as some of these competitions have specific terrain requirements.

The race takes place in the area around the nine towns. The map shows the roads that can be used for the race. A checkpoint is where two or more roads cross. These are either towns or named points of interest. Town names are shown in bold. The course is built by selecting the next checkpoint to head towards.



There are six stages in the race. A stage must start in one of the nine biggest towns. All the towns are keen to host the race as it brings business to the town. A stage has to finish in the town in which it started. The start/finish line for each stage is always in front of the town hall. The politics of the event mean that the race must go through all nine towns at some point. Stages must be at least 150 km but must not exceed 200 km.

The Overall Champion (Yellow Jersey)

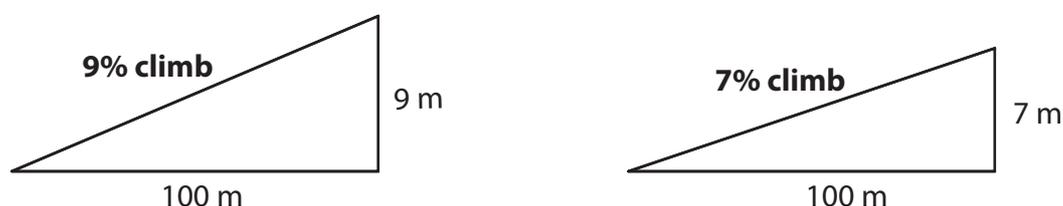
The riders all start together. Each rider is given an individual time for each stage. The time is recorded by spotters using a large stop clock mounted on the top of a van. If a rider fails, for any reason, to complete a stage they can take no further part in the competition. After the first stage the rider with the lowest aggregate time wears a yellow jersey.

The Team Race (Golden Sunflower)

The Team Race also works on aggregate times. Each town has a team of five riders. At the end of each stage the team gets a Stage Team Time. This is the time taken for the fastest three riders from the team to complete the stage. The Stage Team Times for each team are added together and the town with the shortest Overall Team Time is awarded the 'Golden Sunflower'. The same riders do not have to provide the times in each stage.

King of the Mountains (Polka Dot Jersey)

The King of the Mountains is a 'points' competition. Two of the stages of the event have to be climb stages. A climb stage is defined as having either two category 1 climbs or a category 1 climb and a category 2 climb. Both category 1 and 2 climbs should be uphill sections of at least 10 kilometres. A category 1 climb should average greater than or equal to 9% (see diagram) and a category 2 climb should average in excess of 7% but less than 9%.



Spotters are placed at the checkpoints, which mark the top of each climb. The first ten riders past the checkpoint are awarded points. 10 for the first rider, 9 for the second, 8 for the third, and so on, down to 1 point for the tenth rider. The King of the Mountains is the rider with the most points at the end of the climb stages and is entitled to wear a white jersey with red polka dots.

The Sprint Cup (Green Jersey)

The Sprint Cup is also a points competition. One stage of the event must be designated the Sprint Stage. A Sprint Stage can have no climbs greater than 5%. Spotters are placed at six of the checkpoints in this stage (not the start and finish points) to record the first ten riders to go past. As with the King of the Mountains, 10 points are allocated to the first rider, 9 for the second, etc. At the end of the stage the rider with the most points is awarded the Sprint Cup and entitled to wear the Green Jersey for the rest of the event.

Description of the model

Serge DuLac has designed the route for the 'Tour de Tournesol' for many years. Recently he has been working on a spreadsheet model to make this task easier. Unfortunately, before he finished the model, he was called away to Paris as his mother was ill. The organisers have asked you to finish the model and design the route for the 2013 event. Serge has left you a few notes.

Worksheet	Description
Stage Builder	<p>I was going to use this worksheet to try different routes.</p> <p>There is an area on the worksheet to choose which stages are the climbs, which is the sprint and which are just normal stages. There is a mechanism to ensure all the towns are visited and I intended to put in a number of other checks as well.</p> <p>For each stage there are drop-down boxes to choose the start point and subsequent checkpoints. The initial contents of these cells is 'No Path'. In this model 'No Path' has two meanings. In this case it means that the cell is not used on the route.</p> <p>When I tested this I found that if I made a mistake on a stage, I had to set the whole stage back to 'No Path' before I tried again.</p> <p>I decided that no stage would pass more than 20 checkpoints, otherwise it is likely to be too long.</p>
SprintClimb	<p>This worksheet is to help with the design of climbs and sprints. It will show the rate of climb between adjacent checkpoints.</p>
Height above Sea Level	<p>This worksheet will display the height above sea level for all selected checkpoints for each stage.</p>
Relative	<p>This worksheet is a numerical version of the map. Each checkpoint is at a junction, where there are up to four possibilities for the route. This worksheet defines the checkpoints that could be next if a particular route was taken. Zero stands for 'No Path', which here means that that route would take you out of the race area.</p>
Distances	<p>This worksheet will contain the distances between adjacent checkpoints. My friend Raoul has been out and walked them all with a pedometer. In the model the distances are rounded to the nearest kilometre.</p>

Height	Raoul also has a very expensive watch that he uses for his hobby, mountaineering. It has an altimeter on it and he has recorded the height of each checkpoint above sea level. His watch displays this in metres. The worksheet also calculates the difference in height between adjacent checkpoints and the rate of ascent or descent as a percentage.
Checkpoints	This worksheet contains the names and numbers allocated to the checkpoints. This means a checkpoint name can be found out if you are given the checkpoint number, and vice versa.
Distance Calculation	The distances between the checkpoints chosen are calculated in this worksheet and the total distance for a stage worked out.
Climb Calculation	This worksheet calculates the climbs. Climbs are aggregated; this means you might find an 8% climb immediately followed by a 2% climb of equal length ending up as a 5% climb overall.

There are some things within the model that I haven't been asked for but thought it might be fun to do. I hope you find these useful.

Serge Dubac

Some cells in the model are password protected. During your use of the model you may have to unprotect worksheets; the password for this is *edexcel*. Be aware that if you change the contents of any protected cell the model may not work.

Your Task

The organisers of the 'Tour de Tournesol' have asked you to complete the model started by Serge DuLac and design a route for the tour that achieves all the objectives of the four competitions.

The Data

You have received three data files, two from Serge's friend, Raoul, and one from the organisers. The first of Raoul's files is called **RDistances_exam.txt** and contains the distances between adjacent checkpoints. The second file, **RHeight_exam.txt**, contains the height above sea level of each checkpoint.

OResults_exam.txt is a file of test data based on previous years. The information was supplied by the spotters during the race.

Instructions to Candidates

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 **must** be used throughout.

All spreadsheet printouts **must** 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 have been asked to design the route for the '2013 Tour de Tournesol'. In order to run the four competitions (Overall Champion, Team Race, King of the Mountains, Sprint Cup) the route must meet a number of criteria.

On **one** sheet of A4:

- (a) List 12 criteria that the design of the route must meet. (12)
- (b) You have two data sources; Raoul and the spotters. List ways inaccuracies could have been introduced into the data. (5)

Note: Bullet pointed answers or numbered lists must be used.

Save and print your work.

(Total for Activity 1 = 17 marks)

Activity 2 – Computer modelling (suggested time 40 minutes)

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

The model is stored as **Tour de Tournesol_exam.xls**

Open the spreadsheet model and familiarise yourself with it.

(a) Distances

- Import the data contained in **RDistances_exam.txt** into cells A3:E35 of the 'Distances' worksheet.

Hint: You may have to unprotect the worksheet to do this.

- Print off columns A–E and rows 3–18 of the 'Distances' worksheet showing **data**. Remember to show gridlines and row and column headers.

(1)

(b) Height

- Import the data contained in **RHeight_exam.txt** into cells M4:N36 of the 'Height' worksheet.
- Print off columns M–N and rows 4–18 of the 'Height' worksheet showing **data**.

(1)

(c) Stage Builder (Visits)

The table in the range U5:AC27 of the 'Stage Builder' worksheet shows when towns are visited during the race.

- Enter a formula into cell U28 of the 'Stage Builder' worksheet to calculate the total number of visits to Du Fort.
- Replicate this formula across to cell AC28.
- Print off columns U–AC and row 28 of the 'Stage Builder' worksheet showing **formulae**.

(2)

(d) **Stage Builder (Criteria)**

In the 'Climb Calculation' worksheet, the cells J52:O52 show the number of category 1 climbs in each of the stages. The cells J53:O53 show the number of category 1 **and** 2 climbs in each stage.

- Enter a formula into cell I7 of the 'Stage Builder' worksheet which displays "Yes" if there is at least one category 1 climb in Stage 1 and "No" if there are none.
- Replicate this formula across to cell N7.
- Enter a formula into cell I8 of the 'Stage Builder' worksheet which displays "Yes" if there are two or more category 1 or 2 climbs in Stage 1 and "No" if there are not.
- Replicate this formula across to cell N8.

Also in the 'Climb Calculation' worksheet, the cells J51 to O51 show the steepest climb in each stage.

- Enter a formula into cell I9 of the 'Stage Builder' worksheet which displays "Yes" if the steepest climb is 5% or less and "No" if it is not.
- Replicate this formula across to cell N9.

In the 'Distance Calculation' worksheet, the cells B27:G27 show the length in kilometres of each of the stages.

- Enter a formula into cell I10 of the 'Stage Builder' worksheet which displays "Yes" if the length of the stage is 150 km or more and "No" if it is not.
- Replicate this formula across to cell N10.
- Enter a formula into cell I11 of the 'Stage Builder' worksheet which displays "Yes" if the length of the stage is 200 km or less and "No" if it is not.
- Replicate this formula across to cell N11.

The table in cells H14:I20 of the 'Stage Builder' worksheet will show whether the event stages meet the criteria set for the four competitions.

- Enter a formula into cell I15 of the 'Stage Builder' worksheet to calculate the number of towns on the map **not** visited during the event.
- Enter a formula into cell I16 of the 'Stage Builder' worksheet to display "Yes" if all the towns have been visited or "No" if they have not.

You will use columns I–N of row 12 in the 'Stage Builder' worksheet to designate each stage as normal, sprint or climb. 'Climb' or 'Sprint' will only appear in the drop-down box if the stage meets the criteria.

- Enter a formula into cell I17 of the 'Stage Builder' worksheet to calculate the number of stages designated as climb.
- Enter a formula into cell I18 of the 'Stage Builder' worksheet to display "Yes" if **two** stages have been designated as climb stages and "No" if this is not the case.
- Enter a formula into cell I19 of the 'Stage Builder' worksheet to display the number of stages designated as sprint.

- Enter a formula into cell I20 of the 'Stage Builder' worksheet to display "Yes" if **one** stage has been designated as sprint and "No" if this is not the case.
- Print off columns I–K and rows 5–20 of the 'Stage Builder' worksheet showing **formulae**.

(12)

(e) **Use the Model**

The model is used by setting a start point for each stage using the drop-down list in row 6. For each stage, select subsequent checkpoints by using the drop-down lists in the checkpoint cells. **(Warning: Do not choose "No Path" in the middle of a stage – the model will not work if you do.)**

- Use the stage setting area (A5:G26) of the 'Stage Builder' worksheet to choose routes for the six stages, ensuring that the event meets all the criteria.
- Use the drop-down lists in cells I12 to N12 of the 'Stage Builder' worksheet to designate each of the six stages as normal, climb or sprint (remember you need two climbs and a sprint).
- With your best solution showing, print off columns A–G and rows 5–30 of the 'Stage Builder' worksheet showing **data**.
- With your best solution showing, print off columns H–N and rows 5–20 of the 'Stage Builder' worksheet showing **data**.

(9)

(f) **Printouts**

- Collect your printouts together. Ensure you have printed them correctly and that they are in the order you have been asked to print them.

(3)

(Total for Activity 2 = 28 marks)

Activity 3 – Results (suggested time 40 minutes)

The data in the text file **OResults_exam.txt** contains the results of the four competitions for the 2012 event. This is to be used as test data for the model.

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

(a) Spotters

- Import the data from the text file **OResults_exam.txt** into cells A5:S45 of the 'Spotters Data' worksheet.
- Print off columns A–H and rows 5–10 of the 'Spotters Data' worksheet showing **data**.

(1)

(b) Results (Stage 1)

The 'Stage Results' worksheet contains the times and positions of each rider in each stage. It also contains their overall times and positions after each stage. The overall times and positions after Stage 6 will be the final result. The names of the riders are at the beginning and end of the rows.

- Enter a formula into cell C7 of the 'Results Page' worksheet to display the name of the rider who came first in Stage 1.

Hint: the positions at the end of Stage 1 are in column E of the 'Stage Results' worksheet.

- Enter similar formulae into cells C8 and C9 to display the names of the second and third riders respectively.
- Print off columns A–C and rows 7–9 of the 'Results Page' worksheet showing **formulae**.

(5)

(c) Results (Stages 2–6)

- Enter formulae into columns E, G, I, K and M, rows 7–9 of the 'Results Page' worksheet to display the names of the first, second and third riders in each of the other stages.
- Print off columns D–G and rows 7–9 of the 'Results Page' worksheet showing **formulae**.
- Print off columns H–M and rows 7–9 of the 'Results Page' worksheet showing **formulae**.

(5)

(d) Results (Overall Champion)

- Enter formulae into column D, rows 11–13 of the 'Results Page' worksheet to display the names of the first, second and third riders in the overall competition.

(4)

(e) **Results (King of the Mountains)**

- Enter formulae into column D, rows 15–17 of the 'Results Page' worksheet to display the names of the first, second and third riders in the King of the Mountains competition.
- Print off columns B–D and rows 10–17 of the 'Results Page' worksheet showing **formulae**. (2)

(f) **Results (Sprint Cup)**

- Enter formulae into column K, rows 15–17 of the 'Results Page' worksheet to display the names of the first, second and third riders in the Sprint Cup competition. (2)

(g) **Results (Team Race)**

- Enter formulae into column K, rows 11–13 of the 'Results Page' worksheet to display the first, second and third teams in the Team Race Competition.
- Print off columns I–K and rows 10–17 of the 'Results Page' worksheet showing **formulae**. (2)

(h) **Results (Data)**

- With your results showing, print off the 'Results Page' worksheet showing **data**. (4)

(i) **Printouts**

- Collect your printouts together. Ensure you have printed them correctly and that they are in the order you have been asked to print them. (3)

(Total for Activity 3 = 28 marks)

*** Activity 4 – Report and Evaluation (suggested time 30 minutes)**

Write a report to the Organising Committee of the 'Tour de Tournesol', detailing your route and why you chose it. You will need to include charts of the climb stages to show the distance above sea level of each checkpoint.

The report should include:

- a suitable title
- an introduction, explaining what the report is about
- your suggested routes for each stage
- an explanation of how your routes fit the requirements of the four competitions and any other constraints
- an evaluation of how good the model is and how you would improve it for next year.

Proof read your report.

Marks will be awarded for the Quality of your Written Communication (QWC).

Save and print your work.

(Total for Activity 4 = 15 marks)

Standard Ways of Working

All printouts must contain the activity number, your name, candidate number and centre number.

Pages must be securely fastened to the cover sheet and in the correct order.

Minimum font size of 10 should be used for all word processed documents.

(Standard Ways of Working = 2 marks)

TOTAL FOR PAPER = 90 MARKS

BLANK PAGE

BLANK PAGE