

# $\sqrt{\text{ersatile}}$

**Finals Mathematics A-lympiad 2002/2003**

**Garderen, 21 – 22 March 2003**



*The Mathematics A-lympiad is sponsored by TEXAS INSTRUMENTS*

# DESK SHARING

Versatile is a company that specialises in developing and teaching company training courses. Versatile was established in 1979 and has grown much larger over the years. The old office building they have used up until now, has in fact become much too small for the number of employees. Management has decided that Versatile will move to a new office; a beautiful and modern building. It has not yet been decided how the space that will be rented in the new premises will be divided. A decision has not even been made yet about how many floors they intend to rent in the new building.

In this assignment, your team is a consultancy company that has been hired by the Versatile management team to advise on the way the new office should be organised and furnished. Of course your consultancy company will be given quite a few data you either have to or might take into account.

## *Comment on the assignment*

*It is very important that you know from the beginning that you do not yet have the very latest information. Nevertheless you still have to give advice to the Versatile management team before you will be given this current information.*

*You have to hand in this advice tomorrow morning, Saturday, between 08.00 and 09.00 to the members of the committee that are present. As soon as you have done this, you will be given that current information. After that, you will have to check whether your advice still matches that new information and if necessary adapt or supplement your advice.*

*Saturday afternoon you will present your final proposition to the management team on one or more sheets that will be hung up in the room. Visitors who come to see the result of your work on Saturday afternoon, will be involved in judging this presentation.*

*Several aspects that are important for the redivision of Versatile.*

Versatile is specialised in developing and giving company courses. These courses can involve many different subjects. Think of topics like 'company safety' and 'strengthening the works council'. Versatile develops made-to-measure courses. This means that when a customer comes to Versatile for a course, one or more Versatile project workers will start developing that course. After the material has been approved in a project meeting, the course in question will be taught for the company it was developed for.

Therefore, the majority of Versatile workers consists of so-called project workers, who work on projects (developing and giving courses). Quite often more people work on one of these projects. Projects are led by project leaders. A project leader can be in charge of several projects. Except for the project workers and project leaders there are a number of other jobs at Versatile. You can find these below in Table 1, which also lists the number of workers.

Table 1

Function	Number of workers with a 0,2 FTE job	Number of workers with a 0,4 FTE job	Number of workers with a 0,6FTE job	Number of workers with a 0,8FTE job	Number of workers with a 1 FTE job	Total number of workers	Converted to number of FTE jobs
Secretariat	0	9	7	9	5	30	20
Financial department	0	0	2	1	2	5	4
Personnel	0	0	1	0	2	3	2,6
Project workers	2	8	24	50	31	115	89
Project leaders	0	0	2	6	3	11	9
Management	0	0	0	1	3	4	3,8
<b>Total</b>	<b>2</b>	<b>17</b>	<b>36</b>	<b>67</b>	<b>46</b>	<b>168</b>	<b>128,4</b>

In this table the abbreviation FTE is used. This is an abbreviation for Full Time Equivalent and means 'full time job', in other words a job with 40 working hours per week; so someone with a 0,6 FTE job has a 60% working week, that is 24 hours.

As you can see in table 1, there are quite a few people at Versatile who do not work full time, that is less than 1 FTE. Furthermore, you can see that there are in total 168 workers who together fill 128,4 full time jobs.

The number of part time workers and the fact that so many of the project workers work outside the office regularly make the organisation of Versatile complicated. As a result, it happens quite often that many desks and computers are not 'peopled' during working days. This is of course inefficient and expensive. In the new office working space and computers will have to be used more efficiently. One of the options being looked at is the introduction of so-called desk sharing. Workers will no longer have a fixed desk. At the beginning of each working day they choose their desk for the day from the available shared desks.

Also, a lot of time is spent in meetings, as well as at a desk. Especially project leaders are spending large parts of the week in small or big meetings, and are therefore not using a working space, that is to say a desk with a computer. Other workers also spend one or more half-days a week in meetings of some kind.

In the overview below, table 2, you will find information on the relation between the different kinds of work for each type of job. This has been expressed in percentage of job size.

Table 2

	Meeting	Desk	Work outside the office
Secretariat	-	100%	-
Financial department	-	100%	-
Personnel	50%	50%	-
Project workers	10%	30%	60%
Project leaders	30%	30%	40%
Management	45%	30%	25%

This means that a project worker with a 0,4 FTE job will spend on average 1,6 hours in meetings, spend 4,8 hours behind his desk and will be outside the office for 9,6 hours in an average working week. Of course this will vary enormously from week to week, and it is quite possible that such a worker will be outside the office for two days in one week if he's teaching a course.

For the organisation of the new office all kinds of other points and information must be taken into account as well as the data from the tables above. You'll find a list of them below:

- There are government standards for the different individual working spaces: every fixed working space must have 7 m<sup>2</sup> space available. Should a choice be made for flexible office space there is a different standard. See the next point.
- An important choice to be made is the choice between personal, fixed working spaces and so-called *shared desks*. The advantage of shared desks is that it won't be necessary to have a personal desk and computer for every worker. This can mean high savings on fixed office costs. A disadvantage is that every shared desk will have to meet a slightly higher standard for available space. This is a result of the fact that workers with a shared desk must have a place to 'park' their 'personal' items. The government standard for shared desks is 8 m<sup>2</sup>.
- It is easy for 'vacancies' to happen when everybody has their own desk, as can be seen in the current situation at Versatile. The downside to desk sharing is that there are moments when not every worker who is present will have a place to work. This will irritate the worker concerned, and Versatile will still have to pay him or her, even though they can't do their work.
- Also every room with working spaces must have a window with an outside view.
- An enquiry among the Versatile workers reveals that a large majority does not have any desire to work in a so-called 'office garden'; this is a non-subdivided space with a large number of desks.
- A decision must be made for the new office, not just on either flexible or fixed working spaces, but also on the amount of meeting rooms that is necessary. The following spaces will need to be available in any case – this is a rule of thumb for a consultancy agency:
  - one meeting room for a maximum of 30 people (no desks etc.)
  - a number of rooms suitable for meetings between 2, 3 or 4 people.
- Attached you will find a drawing of the floor space in the office building that will be rented. The places for toilets, the elevator shaft, coffee corner and staircase have already been given.
- There is suitable restaurant space elsewhere in the building that is big enough for the Versatile workers, so you don't have to take a canteen into account. This space is also available for meetings with the entire staff.
- As has been mentioned before, it has not yet been decided how many floors will be rented. Both that decision and the way each floor will be organised are a part of your agency's advice.
- Overview of the costs for Versatile:
  - The rent per floor in the new building is 51 000 euro per year
  - Furnishing a fixed working space costs 7000 euro one-off
  - Furnishing a fixed working space costs 9000 euro one-off
  - Furnishing a meeting space costs 1500 euro one-off per person

- Putting in dividing walls between spaces costs 90 euro one-off per linear metre
- Every day that a worker is unable to work costs 300 euro on average

## **ASSIGNMENT**

Make a proposal for an optimal organisation of the office, while taking the above points into account. Keep the various costs in mind and try to keep them as low as possible. Also try to take the wishes of the workers into account as much as possible. Keep in mind that looking only at the costs can have long term consequences for the working atmosphere and as a result the Versatile yield.

For any information you don't have, your consultancy agency will have to make assumptions, which you will have to mention in your proposal!

Your proposal must at least contain:

- A floor plan where all spaces are assigned and working desks are marked.
- A calculation of the costs for the proposal.
- A justification of your choices, where you also clearly indicate what the consequences of your proposal will be for the Versatile workers.

## CONTINUATION SATURDAY MORNING

Versatile wants to see the proposal you just submitted tested with the results of a so-called presence-check. During the last 13 weeks in the *old office* the number of workers present in the building was counted. Every day, at a random, different time, the number of people present was determined. The count did not take people's function into account, just the kind of work that was being performed at the time of counting. Of course only Versatile workers were counted: visitors were not taken into account.

You will find the results of the count in the table below:

Table 3

	Monday	Tuesday	Wednesday	Thursday	Friday
week 1	53 (41-12)	70 (55-15)	97(75-22)	71 (54-17)	90 (67-23)
week 2	50 (39-11)	58 (46-12)	91 (70-21)	73 (57-16)	94 (70-24)
week 3	52 (42-10)	61 (49-12)	111 (85-26)	84 (65-19)	90 (69-21)
week 4	54 (42-12)	134 (103-31)	81 (63-18)	75 (58-17)	80 (64-16)
week 5	60 (44-16)	57 (45-12)	99 (76-23)	71 (57-14)	80 (61-19)
week 6	56 (43-13)	68 (53-15)	111 (87-24)	71 (55-16)	94 (72-22)
week 7	100 (80-20)	56 (44-12)	83 (64-19)	60 (47-13)	52 (40-12)
week 8	60 (46-14)	132 (99-33)	88 (68-20)	79 (61-18)	78 (61-19)
week 9	44 (32-12)	60 (47-13)	91 (69-22)	76 (59-17)	82 (63-19)
week 10	44 (34-10)	60 (50-10)	68 (53-15)	63 (49-14)	92 (70-22)
week 11	57 (44-13)	61 (48-13)	103 (79-24)	71 (53-18)	80 (60-20)
week 12	60 (50-10)	133 (102-31)	91 (73-18)	67 (52-15)	78 (60-18)
week 13	53 (42-11)	72 (56-16)	81 (63-18)	87 (67-20)	93 (71-22)

You see 57(45-12) for the Monday in week 1. This means that at a certain point during that day there were 57 Versatile workers in the office, 45 of which were working at their desk and 12 were in a meeting.

### CONTINUATION OF THE ASSIGNMENT

Investigate to what extent your proposal matches the results of the presence-check. *Remember that nearly every worker had a fixed working space in the old office.* Make a brief report and add it to your proposal.

It might be that this investigation prompts your consultancy agency to change things in your proposal. In that case add the changes in an addition to your original proposal.

Be aware of the fact that you only have limited time today to work out and give a motivation for an addition – should you need to make one.

### PRESENTATION

The presentation takes place in the form of a so-called poster presentation. Every consultancy agency (that is every team) makes a poster to present the core of their final proposal for Versatile. The texts must be in English.

All posters will be on display in the hall. The Versatile customers (that is: the visitors of the presentation, namely members of the committee, teachers, parents and other interested people) will be walking around and asking the consultants (that is you) to clarify the proposal presented on their poster. Pay attention: some of the customers speak English!

The customers will each judge a number of the presented proposals.

It is not yet known whether or in what way these judgments will be taken into account for the final jury decision.

## Appendix 1 – calculating the number of workstations

	FTE count	Percentage which is desk work	hours of work per week	Percentage of work hours at the desk	Employee count	hours of work at desk per week
Personnel		50%				
	0,6		24	12	1	12
	1		40	20	2	40
Project workers		30%				
	0,2		8	2,4	2	4,8
	0,4		16	4,8	8	38,4
	0,6		24	7,2	24	172,8
	0,8		32	9,6	50	480
	1		40	12	31	372
Project leaders		30%				
	0,6		24	7,2	2	14,4
	0,8		32	9,6	6	57,6
	1		40	12	3	36
Total:						1228

An example of a calculation for the employees with an FTE of 1 from the personnel department:

1 FTE = 40 working hours a week. By taking 50% of this we get the number of hours one employee spends at his workstation per week. This is multiplied by the number of employees in the same department with 1 FTE, namely 2. The result we get is 40 hours. This is done with all the employees and the results are added up.

1228 hours / 5 days = 245,6 hours per day.

## Appendix 4: Overview of the rooms and their sizes

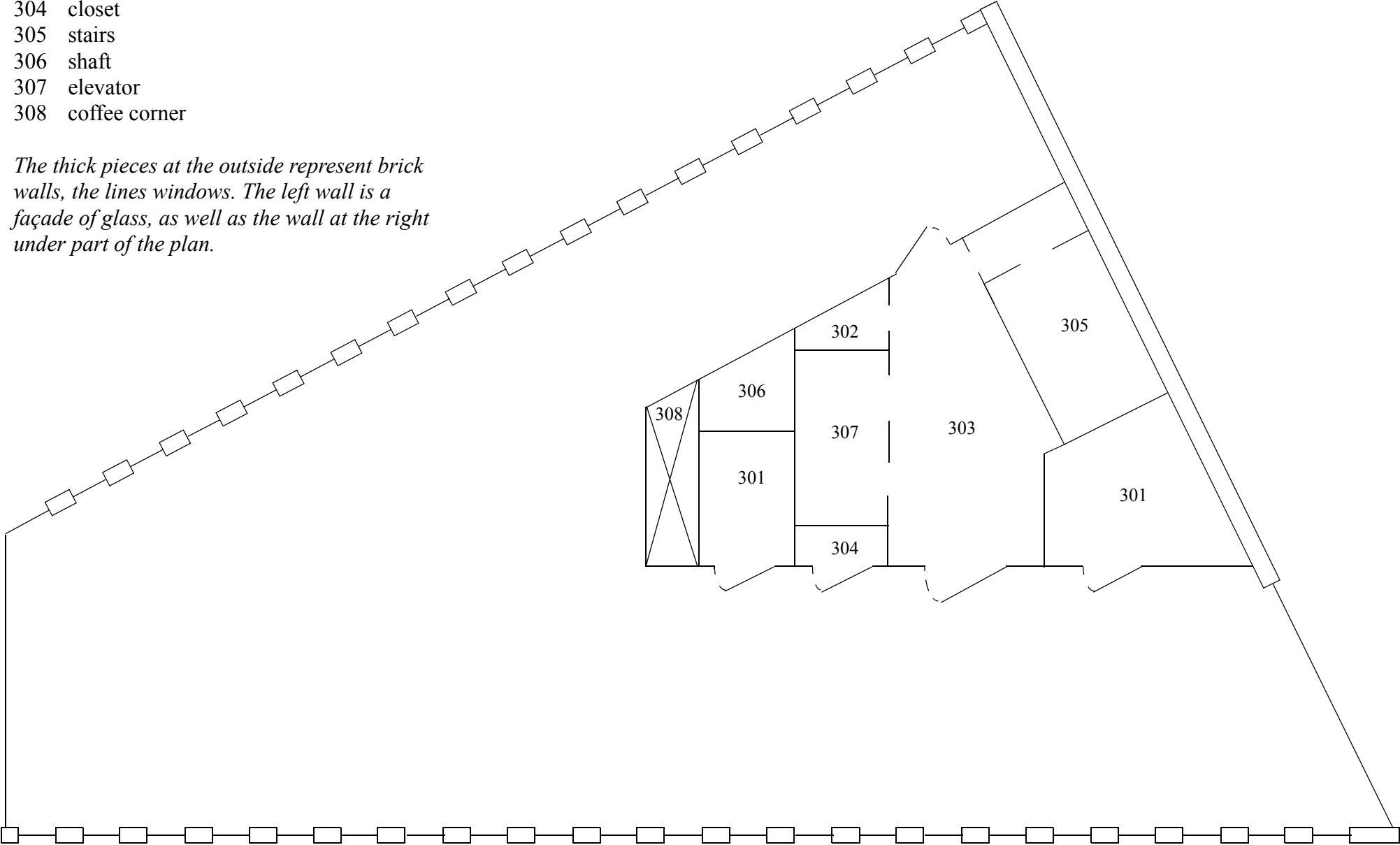
Room	m <sup>2</sup> per person	m <sup>2</sup> per room	Room count	Total m <sup>2</sup>
Conference rooms				
4 persons	4,5	18	1	18
3 persons	4,33	13	1	13
2persons	3,5	7	1	7
30 persons	2,5	83 (the rest is for black-boards/projectors)	1	83
Management offices				
of 1 person	20	20	4	80
Fixed desk rooms				
of 4 persons	7	28	3	84
of 5 persons	7	35	1	35
Workstation sections:				
Financial/Secratial:	9	45	2	90
4 Workstations room	11	44	3	132
5 Workstations room	10	50	3	150
Server rooms:				
Of 1 server	4	4	2	8
Total m <sup>2</sup>			700	



Scale: 1 cm. is 1,5 meter

- 301 toilets
- 302 shower
- 303 hall
- 304 closet
- 305 stairs
- 306 shaft
- 307 elevator
- 308 coffee corner

*The thick pieces at the outside represent brick walls, the lines windows. The left wall is a façade of glass, as well as the wall at the right under part of the plan.*



## Finals mathematics A-lympiad 2002/2003

- Read through the complete problem.
- Use a time schedule: plan your time well. **Be aware that you must hand in your results of the first part of the assignment on Saturday morning before 9.00 a.m. You will get your work back almost immediately, so you do not need to make an extra copy.**
- Start in time writing the advise-report (result of problem 1 ).
- If you don't have your own printer, make sure you come and print the parts that are ready as soon as they are ready. Otherwise there will be a queue on Saturday morning.
- Answers may be given in several ways: by using pictures, graphs, in words, in calculations, tables, etcetera
- On Saturday morning you will get the second part of the assignment; Note that you must also prepare your poster presentation on Saturday morning.
- But: start the preparation for your presentation not earlier than Saturday.
- During the posterpresentation your team is available to answer questions and tell something about your proposal to the 'visitors'.
- The most important part of your work is the method you choose, the reasoning, the way of working, etcetera.
- If you lack any data, you'll have to make logic assumptions yourself and justify them.
- Use a black pen or print at A4-pages. This is necessary because the work has to be copied. Do not use colors on the floorplan, since this will get lost during the copying.
- Don't forget to number the pages.
- Write the names of the team members, together with the name of your school, at the cover.

**The result of your work is a report. One must be able to read this report as a coherent piece of work, without having the assignment next to it. So make sure the relevant data go with it.**

**Lots of fun and good luck!**