Seeking Problem Solvers?

Sample Questions

Question 1

Simon is responsible for scheduling the weekly meetings of four sporting clubs at his campus. The meetings are to be held at lunchtimes, Monday to Friday. Each club has one meeting each week.

All the clubs are able to meet in any lunchtime when they do not have training. The clubs train at lunchtime(s) on the following days (Table 1):

Table 1

Club	Training Days
Netball	Mondays and Wednesdays
Mountaineering	Tuesdays
Triathlon	Mondays and Thursdays
Orienteering	Fridays

- People who join a club **must** attend all training sessions for that club.

1 Simon draws up four possible schedules for the meetings, shown below.

Which one of these schedules does **not** involve a clash with a club's training?

A

	M	Tu	W	Th	F
N					*
M	*				
T				*	
O			*		

B

	M	Tu	W	Th	F
N					*
M	*				
T		*			
O			*		

C

	M	Tu	W	Th	F
N					*
M		*			
T			*		
O	*				

D

	M	Tu	W	Th	F
N		*			
M				*	
T			*		
O					*

E All four schedules involve a clash.

Questions 2 and 3

Aurora, Boulder and Central are three centres in South City. Travelling from Aurora to Central involves catching a bus from Aurora to Boulder, and a tram from Boulder to Central. The travel time for each of these trips is:

Aurora $\xrightarrow[14 \text{ minutes}]{\text{bus}}$ **Boulder** $\xrightarrow[9 \text{ minutes}]{\text{tram}}$ **Central**

Unless stated otherwise, assume that:

- buses leave Aurora every 10 minutes and trams leave Boulder every 15 minutes;
- the time taken for a person to transfer between vehicles is negligible;
- all vehicles leave exactly on time; and
- journeys are not interrupted.

Suppose that a bus arriving at Boulder immediately returns to Aurora where it waits for the next scheduled leaving time. Similarly, trams immediately return from Central.

2 What is the shortest time that a bus would have to wait at Aurora after it has returned from Boulder?

A 2 minutes
B 4 minutes
C 8 minutes
D 10 minutes
E 12 minutes

3 What is the minimum number of buses and trams needed to provide the service between Aurora and Central?

A 2 buses and 2 trams
B 2 buses and 3 trams
C 3 buses and 2 trams
D 3 buses and 3 trams
E 3 buses and 4 trams

Questions 4 and 5

Figure 1 shows the results of a study carried out in the USA. Approximately 250 000 men were followed over 12 years, and for those who died, the cause of death was established. The graph shows the variation with average alcohol intake of the mortality rate for three such causes, together with the variation in mortality rate from all causes. Coronary Heart Disease (CHD) is a particular and common cardiovascular disease. Mortality rates are shown as a proportion of the deaths that occur with zero alcohol intake. Also shown are the average alcohol intakes for USA and France.

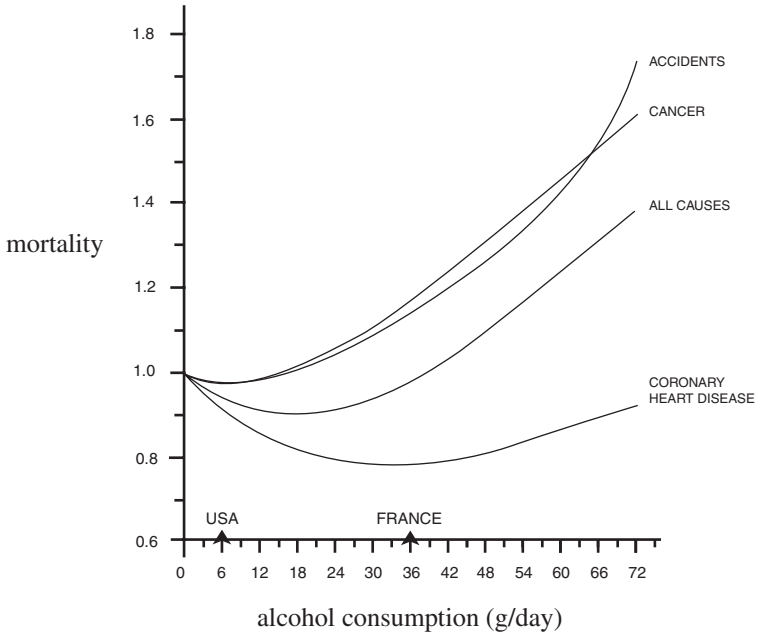

Figure 1

4 According to Figure 1, compared with men who consume little or no alcohol, men who regularly consume 18 g of alcohol (about one standard drink) per day are most likely to show mortality rates that are

A decreased for CHD and accidents, and increased for cancer.
B decreased for CHD and cancer and increased for accidents.
C decreased for CHD and unchanged for accidents and cancer.
D increased for CHD and accidents, and increased for cancer.
E increased for CHD and unchanged for accidents and cancer.

5 Suppose that all relevant factors in a French population of males are similar to those for the men in this USA study, except for levels of daily alcohol consumption.

Which one of the following is the best estimate of the difference in expected mortality from CHD for French men compared with that for USA men?

A About 10% less.
B About 30% less.
C About the same.
D About 10% more.
E About 30% more.

Questions 6-8

A school needs to assign staff to teach five subjects to a Year 8 class. For this class, each week there are 5 lessons of English, 4 lessons of Mathematics, 3 lessons of Science, 3 lessons of History and 3 lessons of Social Studies.

Table 2 indicates the teachers that are available to teach Year 8, the number of lessons each teacher has available to teach Year 8 and the subjects they can teach. Note that the same teacher must teach a subject to a class throughout the week.

Table 2

Teacher	Number of lessons the teacher can teach	Subjects the teacher teaches
Kim	8	History, Social Studies and English
Van	7	Mathematics and Science
Sue	6	History and Social Studies
Jenny	6	English and Social Studies
Nick	6	Mathematics and Science

6 By how much does the total number of lessons that the five teachers can teach exceed the number of lessons required to teach the five subjects to the Year 8 class?

A 18 lessons more
B 17 lessons more
C 15 lessons more
D 13 lessons more
E 12 lessons more

7 What is the minimum number of these five teachers needed to teach the five subjects to the Year 8 class?

A two
B three
C four
D five
E It is not possible to teach all of these subjects with just these teachers.

8 The teachers try to arrange it so that, after they are assigned to teach the five subjects to the Year 8 class, each teacher has three lessons free when they are not teaching.

Is this possible?

A This would be possible if Kim taught English and Van taught Mathematics.
B This would be possible if Kim taught English and Nick taught Mathematics.
C This would be possible if Jenny taught English and Van taught Mathematics.
D This would be possible if Jenny taught English and Nick taught Mathematics.
E It is not possible.

Seeking Problem Solvers? ANSWERS

1. **B**
2. **A**
3. **C**
4. **C**
5. **A**
6. **C**
7. **B**
8. **A**