JUNE 2014

The pharmaceutical company, *Abetter*, wishes to test the effectiveness of a new safe vaccine developed to immunise people against the common cold. The new vaccine is to be tested against a placebo vaccine.

To test the vaccine using a pilot study, *Abetter* has 20 volunteers, A, B, C, ..., T. The sex and age of each of these volunteers are shown in the table.

Volunteer	A	B	C	D	E	F	G	H	I	J
Sex	M	M	M	M	M	M	M	M	M	M
Age (years)	23	42	35	25	61	44	54	35	57	66

Volunteer	K	L	M	N	O	P	Q	R	S	T
Sex	F	F	F	F	F	F	F	F	F	F
Age (years)	42	62	56	24	33	47	28	67	51	34

The three suggested designs for this investigation are completely randomised, randomised block and matched pairs.

(a) Produce a table layout, together with an explanation, to indicate how *Abetter* should allocate the 20 volunteers to the two treatments of placebo vaccine and new vaccine so that the design is:

(i) completely randomised;

(ii) randomised block;

(iii) matched pairs.

[6 marks]

(b) Give an advantage for the investigation of using a design that is:

(i) completely randomised;

(ii) randomised block;

(iii) matched pairs.

[3 marks]

(c) State, with a reason, which one of the three designs you would recommend to *Abetter* for this investigation.

[2 marks]

JUNE 2016

As part of an investigation into weight loss diets, sixteen men, all of whom were approximately 15 kilograms overweight, were chosen.

Four men were chosen randomly from each of the age groups 20–29 years, 30–39 years, 40–49 years and 50–59 years.

Each man within an age group was assigned at random to a different one of four types of diet, D1, D2, D3 and D4. Each diet provided exactly the same number of calories per day.

(a) (i) Identify the blocking factor for this investigation.

(ii) Identify the treatment factor for this investigation.

(iii) Explain the purpose of a blocking factor in such an investigation.

[4 marks]

(b) The weight loss achieved for each man in this investigation was recorded.

(i) Construct a fully labelled table that could be used to record the weight losses achieved by the men in this investigation.

(ii) State the type of experimental design used in this investigation.

(iii) Name the technique that you would use in order to analyse the data obtained from this investigation.

[6 marks]

JUNE 2012

An investigation into the effect of a particular chemical on ripening times of fruit in cold storage is carried out by a company that stores apples of three varieties: Red Delicious, Golden Delicious and Pink Lady.

The chemical is applied to three apples, one of each variety, selected at random from those that are to be kept in cold storage.

Three further apples, again one of each variety, are selected at random from those that are to be kept in cold storage. These apples are not treated with the chemical.

In addition to the chemical, it is believed that the variety of an apple might influence its time to ripening.

The length of time to ripening is measured for the six apples in the investigation.

(a) Identify those apples that constitute the **control group**. *(1 mark)*

(b) Explain the purpose of selecting apples for treatment with the chemical at random from those to be kept in cold storage. *(1 mark)*

(c) Name the technique that you would use in order to analyse the data obtained from this investigation. *(2 marks)*

(d) Name the **blocking factor**. *(1 mark)*

Blind Trials

A blind trial is when the subject _____

_____

In some cases a _____

may be used which is a pill or treatment which contains no active ingredient

The reason for this is to see whether improvements (or not) are due to the new treatment or _____

Some patients may appear to improve because _____

_____

which can give false results

Although the patient will not know whether they are taking a placebo or not, they will have consented to all aspect s of the trial and therefore will know that they *may* be taking a placebo and therefore _____

_____

In a ***double blind trial*** neither the _____

_____

knows who is taking the placebo and who is taking the new treatment

The reason for this is to:

Experimental Error

Experimental error is the effect of factors other than _____

_____

i.e. a difference in variables is due to *experimental error* rather than a _____

Experimental error _____

be completely eliminated

Experimental Design

The simplest experimental design used is _____

_____

In paired comparisons, experimental error is _____

by applying both treatments to the _____

_____

EXPERIMENTAL DESIGN
Revision Mat

Randomisation

The purpose of randomisation is to _____

_____

This is usually done through _____

although this is often difficult to execute well

However, if you take notice of every criticism you will end up

_____

Control Groups

If a new treatment is applied to an **experimental group** then a **control group,** which receives _____

_____ which is needed to act as a measure of the effect of not applying the new treatment (as a _____)

It is necessary to have the **control group** and **experimental group** matched

_____ for the best comparisons.

This does not mean that the people within the group must be

_____

just that the _____

_____ should be similar

Designs

Match each of the descriptions below to its type of design

Randomized Block Design *Because this design reduces variability and potential confounding, it produces a better estimate of treatment effects.*	the experimenter divides participants into subgroups such that the variability within subgroups is less than the variability between subgroups. Then, participants within each subgroup are randomly assigned to treatment conditions.
Matched Pairs Design	The same participants take part in each condition of the independent variable. This means that each condition of the experiment includes the same group of
Repeated Measures Design	It is used when the experiment has only two treatment conditions; and participants can be grouped into pairs, based on one or more blocking variables. Then, within each pair, participants are randomly assigned to different treatment participants.