A Level Biology B

H422/03 Practical skills in biology

Question Set 11

1. (a) Fallopian tube cancer may result in the formation of tumours in the epithelial tissue lining the Fallopian tubes.

Name the type of cell division that occurs in a tumour.

[1]

(b) The table below contains information about some of the methods used for detecting cancer.

Complete the table by inserting the missing information.

Method used to detect cancer	What does the method involve?	Which parts of the body are examined?
Blood test	antibody test (ELISA)	blood
Mammography	low energy x-rays	.....
CT scan	.....	whole body scans
.....	high frequency sound waves	soft tissue
MRI scan	..... field and ..... waves	soft tissue, bone, brain or spinal cord tumours
.....	radioactive tracer and gamma waves	produces three-dimensional images of any part of the body
Biopsies	needle, scalpel or speculum	tissues identified as possible tumours

[5]

(c) (i) Fallopian tube cancer treatment often results in infertility. Patients whose treatment has resulted in infertility may be offered egg freezing and subsequent *in vitro* fertilisation (IVF) treatment at a fertility clinic.

Fertility clinics have different mean annual pregnancy rates. Table 2.1 contains some information about mean annual pregnancy rates in two clinics each treating 400 patients.

	Mean annual pregnancy rate (% embryos transferred)
Clinic A	23
Clinic B	16

Table 2.1

The standard deviation, *s*, for both means is 9.7.

The Student's *t*-test can be performed to compare the mean annual pregnancy rate at each clinic and determine if the two are significantly different from each other.

State the null hypothesis for this test.

[1]

(c) (ii) Calculate the variance, s^2, for these means.

[1]

(c) (iii) Calculate the *t* value for the data in Table 2.1.

Use the formula:

$$t = \frac{\left|\bar{x}_A - \bar{x}_B\right|}{\sqrt{\frac{s_A^2}{n_A} + \frac{s_B^2}{n_B}}}$$

Give your answer to **three** decimal places.

[3]

(c) (iv) Critical values for degrees of freedom >100 are shown in Table 2.2.

Degrees of freedom	**Level of probability**		
	0.05	**0.01**	**0.001**
>100	1.960	2.576	3.291

Table 2.2

Using Table 2.2 and your answer to **(c)(iii)**, comment on the mean annual pregnancy rates for clinics A and B.

[3]

(d) The stages in one type of IVF treatment are shown below:

1. Hormones are used to stimulate several follicles within the ovary to mature at the same time.

2. Follicles are collected from the ovaries and the oocytes removed.

3. These oocytes are mixed with sperm in a Petri dish.

4. After several days the oocytes are checked for fertilisation.

5. Any resulting embryos are left to develop in an incubator for two to five days.

6. One embryo is transferred into the uterus.

During this treatment:

- The typical number of oocytes collected during stage 2 is between 5 and 25.
- Approximately 50% of the oocytes collected will be fertilised during stage 3.
- Of the total number of oocytes collected during stage 2, about 25% will result in a healthy embryo.

Discuss the ethical issues raised by this type of IVF.

You should use the information provided in your answer.

[4]

Total Marks for Question Set 11: 18