

# UNIVERSITY COLLEGE LONDON

*University of London*

## EXAMINATION FOR INTERNAL STUDENTS

*For the following qualifications :-*

*M.B., B.S.*

### **MBBS: Written Paper (year 2)**

COURSE CODE : **MBBS2003**

DATE : **21-MAY-02**

TIME : **14.30**

TIME ALLOWED : **3 hours**

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**TURN OVER**

## Phase 1, Year 2: May 2002

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### Modified Essay Question paper

**3 hours are allowed for this paper.**

- **You should attempt all 26 questions, answering each one on the page for that question** – if you need more space, continue on the reverse of the page for that question only. Pages will be separated and given to different people to mark.
- **You are provided with a sheet of bar-code labels. Place one label in the space marked on the computer-readable card and one label on the page for each question except questions 4, 14, 15, 23 and 24 – these questions are answered on the computer-readable card.**
- **For questions 4, 14, 15, 23 and 24 you must transfer your answers to the appropriate numbered lines of the mark-sense (computer-readable) card that is provided.**
- **Read the instructions for questions 4 and 23 very carefully.**
- **You should read through all parts of each question before you begin to answer it – the number of marks for each part question is shown.**
- **Most questions are linked to clinical scenarios. Information about the patient is shown at the top of each question; this may differ from one question to another, as additional information is relevant to the question being asked.**
- **This question paper must not be removed from the examination room.**

Place your bar-code label here

**Question 1**

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur.

At the time of the fracture she became extremely agitated and suffered a lot of pain. During the subsequent weeks spent in traction, the pain was carefully managed, but she became increasingly stressed at the time she was absent from work.

Which hormones mediate the physiological and metabolic effects of acute stress:

(1 mark)

chronic stress:

(1 mark)

What is the major metabolic effect of these two hormones?

(2 marks)

How do the cellular mechanisms of these two hormones differ?

(6 marks)

Place your bar-code label here

### Question 2

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur, meaning that she had to undergo orthopaedic surgery.

Explain why she received the following drugs either as a pre-medication prior surgery or in the operating theatre:

atropine

(1 mark)

diazepam

(1 mark)

pancuronium

(2 marks)

thiopentone (thiopental)

(3 marks)

nitrous oxide

(3 marks)

Place your bar-code label here

**Question 3**

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur.

At the time of the fracture she became extremely agitated and suffered a lot of pain. During the subsequent weeks spent in traction, the pain was carefully managed, but she became increasingly stressed at the time she was absent from work.

She was prescribed the benzodiazepine diazepam for her anxiety state.

Why are benzodiazepines, rather than barbiturates, used to treat anxiety?

(3 marks)

What other medical conditions can be treated with benzodiazepines

(3 marks)

What factor(s) determines the therapeutic application of individual benzodiazepines — and why. Include named examples in your answer.

(3 marks)

Explain what is meant by (and give examples of) a benzodiazepine receptor...:

(3 marks)

**Question 4**

Answer this question on lines 1 - 6 of the computer-readable card

On examination Angela was found to have a shortened laterally rotated right leg.

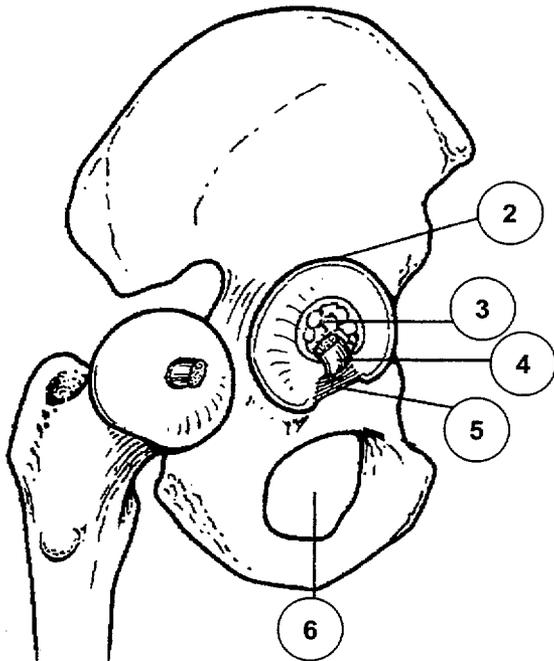
**Use line 1 of the card to mark one of the following statements true:**

- A) She may have fractured the neck of her right femur; this is serious because the blood supply to the shaft of this bone reaches it via the femoral neck
- B) She may have fractured the neck of her right femur; this is not serious because the blood supply to the head, neck and shaft of this bone is rich and highly anastomotic.
- C) She may have fractured the neck of her right femur; this is not serious because the head of the femur is well supplied with arterial blood via the ligament of the head of the femur.
- D) She may have fractured the neck of her right femur; this is serious because the blood supply to the head of this bone reaches it via the femoral neck
- E) She may have fractured the shaft of her right femur; this is serious because the blood supply to the head of this bone travels along the shaft to reach it.

For each numbered item in the diagram below select the **one** appropriate label (A – I) from the list below.

Only one answer is correct for each number.

Some labels may be used more than once, and some may not be used at all.



- A) Fat pad
- B) Ischiofemoral ligament
- C) Ligament of head of femur
- D) Obturator foramen
- E) Pubofemoral ligament
- F) Rim of labrum acetabulare
- G) Sciatic nerve
- H) Transverse ligament
- I) Zona orbicularis

Place your bar-code label here

**Question 5**

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur.

It is unusual for such a young woman to fracture her hip in a relatively mild fall. However, Angela had undergone hysterectomy and partial resection of the ovaries when she was 30 years old, leading to a premature menopause.

What happens to each of the following hormones at the menopause?

(1 mark each)

oestradiol	
progesterone	
LH	
FSH	

What condition might you suspect had led to Angela's hip being abnormally susceptible to fracture?

(1 mark)

What are the key features of this condition

(4 marks)

What simple, non-invasive investigation might you perform to confirm your suspicion?

(2 marks)

Place your bar-code label here

**Question 6**

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur.

Osteocalcin (bone Gla protein) is induced by calcitriol.

Describe the steps involved in the synthesis of the hormone calcitriol in each of the following organs (3 marks)

skin	
liver	
kidney	

Describe the roles calcitriol in calcium homeostasis (3 marks)

What are the effects of calcitriol on osteoblasts? (2 marks)

What are the effects of calcitriol on osteoclasts? (2 marks)

Place your bar-code  
label here

**Question 7**

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur.

Osteocalcin (bone Gla protein) is induced by calcitriol. Analysis of the gene for osteocalcin shows that it has an inhibitory glucocorticoid response element overlapping the TATA box.

Explain what is meant by induction of a protein by a hormone such as calcitriol. Describe in outline the way in which calcitriol acts to induce a protein

(3 marks)

Explain what is meant by the TATA box

(2 marks)

Explain how the analysis of the osteocalcin gene may explain Angela's bone problem

(4 marks)

Place your bar-code  
label here

**Question 8**

Angela B is a 50 year old investment banker. She has a stressful job and a very hectic lifestyle.

She tripped over the hearthrug, fell awkwardly and fractured her femur.

Angela became depressed following her surgery.

She was prescribed the antidepressant imipramine. What effect does this have on central neurones?  
(4 marks)

Why does this medication give Angela a dry mouth?  
(2 marks)

What would be the potential major disadvantage of replacing imipramine with the monoamine oxidase (MAO) inhibitor phenelzine?  
(4 marks)

Place your bar-code label here

**Question 9**

While on elective in Nepal you take a short holiday to go trekking in the Himalayas. In a remote village you notice that many of the young women have a pronounced swelling around their necks.

Without the need for any of the facilities that may be available at the hospital in Kathmandu, what would be your diagnosis? What is likely to be the underlying cause of the problem?

(1 mark)

What is the most likely sequence of endocrine events leading to the swelling?

(2 marks)

You take blood samples from several of the affected women back to the hospital in Kathmandu. Which three hormones would you ask to be measured, and what results would you expect?

(1 mark for each correct hormone, 1 mark for each correct expected result)

Hormone	Expected result

What treatment would you recommend to the affected women?

(1 mark)

List two ways in which this treatment could be administered

(2 marks)

What is the likely outcome of pregnancy in these women if they are not treated, and what is the cause of this outcome?

(3 marks)

Place your bar-code  
label here

**Question 10**

This question does not relate to any specific patient

Explain the concept of heuristics

(3 marks)

Briefly describe factors which affect decision making

(7 marks)

Place your bar-code  
label here

**Question 11**

**This question does not relate to any specific patient**

In the context of the Doctor Patient consultation two distinct social roles are played out. These have been described by Talcott Parsons as the 'Physician Role' and the 'Patient Role' respectively.

(10 marks)

Outline the obligations and duties of each of these roles and explain why they may not be the ideal way to conduct the medical consultation.

Place your bar-code  
label here

### Question 12

Frederick D is a 75 year old former professor.  
His wife is worried that he has been getting increasingly forgetful over the last 18 months - recently, for example, when he got in the car to drive home, he could not remember where the indicator and light switches were.

What kind of assessment might be appropriate, and how might you help Mr and Mrs D?

(10 marks)

Place your bar-code label here

**Question 13**

Frederick D is a 75 year old former professor. His wife is worried that he has been getting increasingly forgetful over the last 18 months - recently, for example, when he got in the car to drive home, he could not remember where the indicator and light switches were.

As well as becoming confused and forgetful he has become increasingly hard of hearing.

Weber's test shows that the sound is not localised to either ear and the Rinne test shows that air conduction is better than bone conduction bilaterally.

His audiogram shows a 40 – 60 dB loss of hearing at frequencies above 2500 Hz.

Which of the following most readily describes his hearing loss in the range greater than 2500 Hz? (2 marks)

mild	
moderate	
severe	
profound	

Which of the following most readily describes the difficulty he has in understanding speech? (2 marks)

Difficulty in hearing vowel sounds in sentences such as 'how now brown cow'.	
Difficulty in hearing consonants such as 's' and 't' and sounds such as 'sh' in sentences such as 'the cat sat on the mat' or 'he shouldn't do that'.	

Which of the following best describes Frederick's hearing deficit? (2 marks)

Bilateral conduction deafness	
Complete deafness	
Conduction deficit on the left	
Sensorineural deafness on both sides	
Sensorineural deficit on the right	

Given the nature of his hearing deficit, which of the following best describes the possible cause? (2 marks)

damage of hair cells at the base of the cochlea	
damage of hair cells at the apex of the cochlea	

**Question 14**

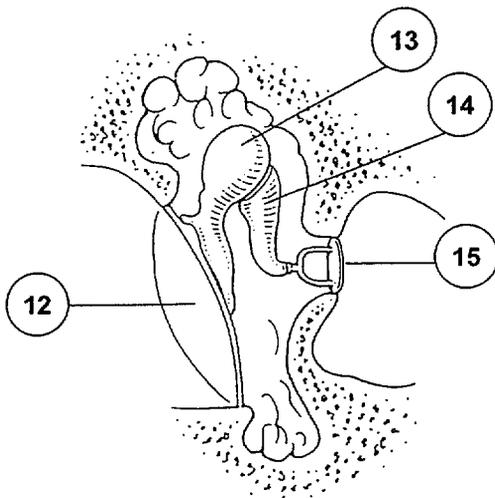
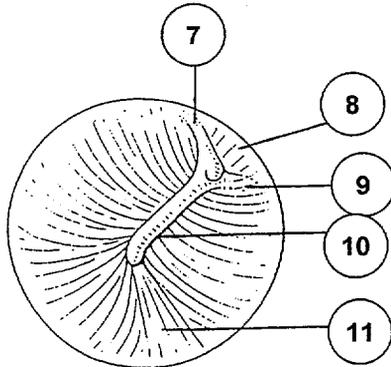
Answer this question on **lines 7 - 15** of the computer-readable card

Frederick D is 75 years old. As well as becoming confused and forgetful over the last 18 months, he has become increasingly hard of hearing and having problems keeping his balance.

For each numbered item in the diagrams of the ear below select the **one** appropriate label (A – P) from the list below.

Only one answer is correct for each number.

Some labels may be used more than once, and some may not be used at all.



- A) Ampulla
- B) Anterior malleolar fold
- C) Canal for facial nerve
- D) Cochlea
- E) Cone of light
- F) Fenestra vestibuli (oval window)
- G) Flaccid part of membrane
- H) Incus
- I) Lateral semicircular canal
- J) Long handle of malleus
- K) Malleus
- L) Posterior malleolar fold and lateral process of malleus
- M) Posterior semicircular canal
- N) Semicircular duct
- O) Stapes
- P) Tympanic membrane

**Question 15**

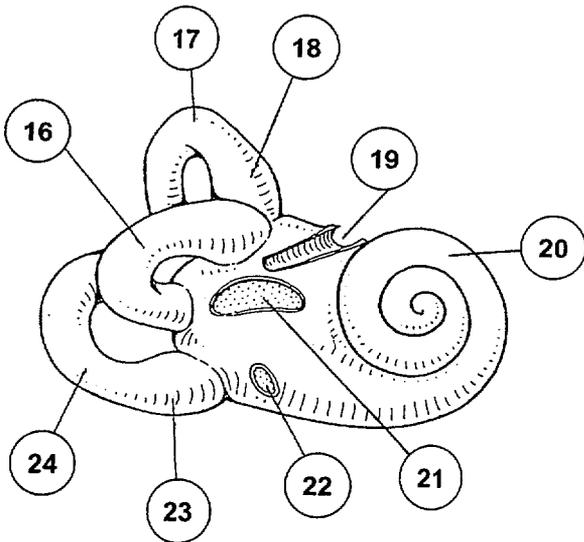
Answer this question on **lines 16 - 32** of the computer-readable card

Frederick D is 75 years old. As well as becoming confused and forgetful over the last 18 months, he has become increasingly hard of hearing and having problems keeping his balance.

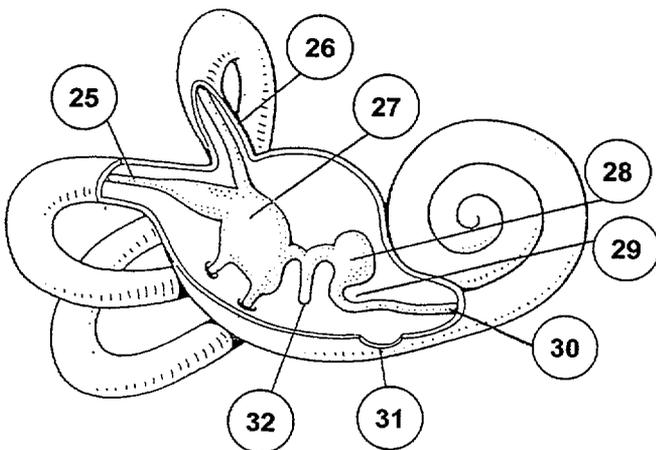
For each numbered item in the diagrams of the ear below select the **one** appropriate label (A – P) from the list below.

Only one answer is correct for each number.

Some labels may be used more than once, and some may not be used at all.



- A) Ampulla
- B) Anterior (superior) semicircular canal
- C) Canal for facial nerve
- D) Cochlea
- E) Cochlear duct
- F) Ductus reuniens
- G) Endolymphatic duct
- H) Fenestra cochleae (round window)
- I) Fenestra vestibuli (oval window)
- J) Lateral semicircular canal
- K) Malleus
- L) Posterior semicircular canal
- M) Saccule
- N) Semicircular duct
- O) Stapes
- P) Utricle



Place your bar-code  
label here

### Question 16

Frederick D is a 75 year old former professor. His wife is worried that he has been getting increasingly forgetful over the last 18 months - recently, for example, when he got in the car to drive home, he could not remember where the indicator and light switches were.

As well as becoming confused and forgetful he has become increasingly hard of hearing.

Unfortunately Professor D later developed carcinoma of the bowel and needed an operation. By this time he had become more confused and it was decided that he did not have the capacity to consent to surgery.

Set out in the form of an argument the justification for the surgeon to operate on Professor D (5 marks)

What are the legal criteria for assessing a person's capacity to give consent to surgery? (5 marks)

Place your bar-code label here

### Question 17

Amelia is a 16 year old girl; she was brought to the Accident & Emergency Department with a short history of headache, fever, nausea and vomiting.

List 3 possible causes of her condition.

(3 marks)

A lumbar puncture was performed and the CSF gave the following results:

White blood cells	220 /mm <sup>3</sup> (normal <5 /mm <sup>3</sup> )
	90% polymorphonuclear cells (neutrophils)
Red blood cells	16 /mm <sup>3</sup>
Protein	0.7g /dL (normal < 0.41g/dl)
Glucose	1.5 mmol /L (blood glucose 6.1 mmol /L)

Which possible diagnosis is this most compatible with?

(1 mark)

List 3 other tests that could be performed on the CSF to help with the diagnosis and her aid treatment?

(3 marks)

How might this disease be prevented in others?

(3 marks)

Place your bar-code  
label here

**Question 18**

Mary W is 70, and is suffering increasingly from stiffness and joint pain, which she fears is arthritis.

Describe how you would take a history of her presenting complaint.

(10 marks)

Place your bar-code  
label here

**Question 19**

Mary W is 70, and is suffering increasingly from stiffness and joint pain, which she fears is arthritis.

After a visit to the rheumatology clinic the diagnosis was confirmed as osteoarthritis.

Which class of steroid hormone is best known for its anti-inflammatory effects?

(2 marks)

Give two examples of synthetic members of this steroid class.

(2 marks)

Which iatrogenic disorder can arise from prolonged treatment with these steroids?

(2 marks)

List four of the major symptoms of this iatrogenic disorder.

(4 marks)

Place your bar-code label here

**Question 20**

Mary W is 70, and is suffering increasingly from stiffness and joint pain, which she fears is arthritis.

After a visit to the rheumatology clinic, where the diagnosis was confirmed as osteoarthritis, she was prescribed the anti-inflammatory steroid hydrocortisone.

How does hydrocortisone produce its anti-inflammatory effect?

(5 marks)

List **three side** effects that might occur if a glucocorticoid such as prednisolone were given orally as an anti-inflammatory agent.

(3 marks)

Place your bar-code  
label here

**Question 21**

Mary W is 70, and is suffering increasingly from stiffness and joint pain, which she fears is arthritis.

After a visit to the rheumatology clinic, where the diagnosis was confirmed as osteoarthritis, she was prescribed the anti-inflammatory steroid hydrocortisone.

What coping strategies are likely to be most helpful for a patient like Mary with a chronic illness?  
(5 marks)

What types of adjustment will be necessary when Mary finds she has a debilitating chronic illness.  
(5 marks)

Place your bar-code  
label here

**Question 22**

Mary W is 70, and is suffering increasingly from stiffness and joint pain, which she fears is arthritis.

After a visit to the rheumatology clinic, where the diagnosis was confirmed as osteoarthritis, she was prescribed the anti-inflammatory steroid hydrocortisone.

What support services and resources are available in the community to help her to cope with her disability?

(10 marks)

### Question 23

**Answer this question using lines 33 - 35 of the computer-readable card.**

Margaret J presents with a traumatic injury to the soft tissues on the anterior aspect of her elbow in the region of the cubital fossa, and diminished hand function.

In particular she is unable properly to abduct her thumb. She also has a sensory deficit in her hand affecting, among other regions, the palmar aspect of her thumb.

This question is worth 3 marks:

If you are sure of your answer, enter the same letter (A – E) on lines 33, 34 and 35 of the card

If you are fairly sure of your answer, enter the same letter ( A – E) on lines 33 and 34, leaving line 35 blank

If you are unsure of your answer, enter your answer on line 33, leaving lines 34 and 35 blank

Mark which one of the following statements is true:

- A) She is likely to have diminished sensation over the palmar aspect of her little finger
- B) She is likely to have diminished power of flexion of the distal interphalangeal joint of all her fingers
- C) She is likely to have diminished power of flexion of the distal interphalangeal joint of her index and middle fingers
- D) She is likely to have diminished sensation over the dorsal web space between thumb and index finger
- E) Her digits will show diminished power of extension

**Question 24**

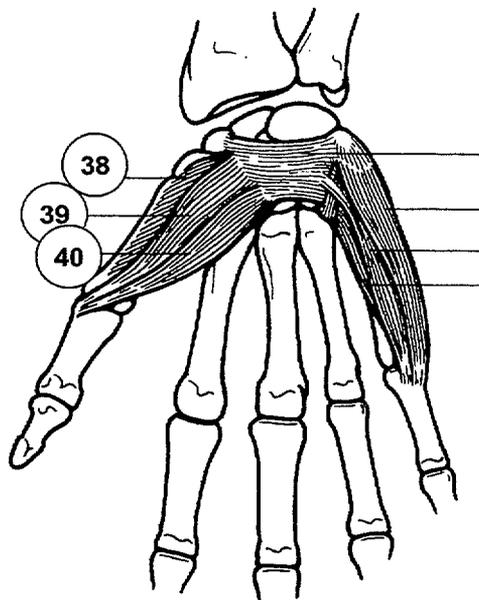
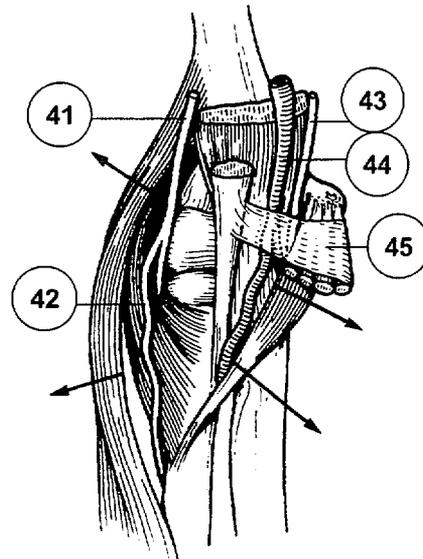
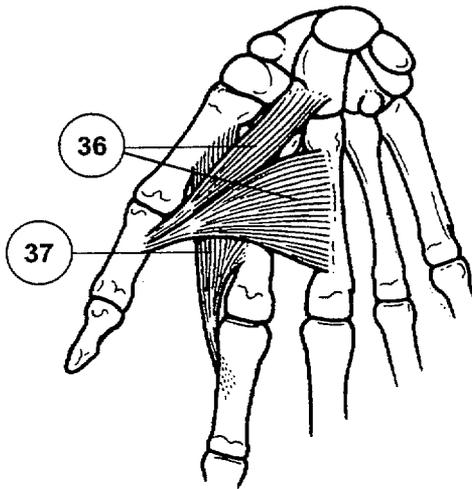
Answer this question on lines 36 - 45 of the computer-readable card

Margaret J presents with a traumatic injury to the soft tissues on the anterior aspect of her elbow in the region of the cubital fossa, and diminished hand function.

For each numbered item in the diagrams of the hand and elbow below select the one appropriate label (A – P) from the list below.

Only one answer is correct for each number.

Some labels may be used more than once, and some may not be used at all.



- A) Abductor digiti minimi
- B) Abductor pollicis brevis
- C) Bicipital aponeurosis
- D) Brachial artery
- E) First dorsal interosseous muscle
- F) Flexor digiti minimi
- G) Flexor pollicis brevis
- H) Flexor pollicis longi
- I) Flexor retinaculum
- J) Median nerve
- K) Oblique and transverse heads of adductor pollicis
- L) Opponens digiti minimi
- M) Opponens pollicis
- N) Radial nerve
- O) Superficial branch of radial nerve
- P) Transverse metacarpal ligament

Place your bar-code label here

**Question 25**

Mr and Mrs Khan have been trying, unsuccessfully, for a family for several years. They attend a fertility clinic, and after ascertaining that Mr Khan's sperm count is high, Mrs Khan starts a course of treatment with clomiphene.

How does clomiphene act.

(1 mark)

What effect does clomiphene have on the circulating levels of gonadotrophins:

(1 mark)

No change	
Increase	
Decrease	

What is the explanation for this effect of clomiphene on circulating levels of gonadotrophins

(3 marks)

Name three other means of influencing circulating gonadotrophin levels and tick whether the effect will be an increase or decrease

(2 marks each)

What proportion of the infertile population is categorised as 'unexplained'.

(1 mark)

Place your bar-code  
label here

**Question 26**

A systematic review was undertaken to determine the efficacy of clomiphene in treating women with unexplained infertility.

Six trials were included, and the pooled odds ratio for producing pregnancy was 2.37 (95% confidence interval 1.22 – 4.62) for those treated with clomiphene compared with those not given clomiphene.

Explain what is meant by the odds ratio in this context

(3 marks)

Do the results suggest good evidence that clomiphene increases the likelihood of pregnancy? Explain your answer

(3 marks)

The results of the trials were statistically homogeneous. Explain what is meant by this.

(4 marks)