

Surname	Initial(s)
Signature	

Paper Reference(s)

5006 5026

Edexcel GCSE

Science (5006)

Biology (5026)

B1b – Topics 3 and 4

Foundation and Higher Tier

Friday 21 November 2008 – Morning

Time: 20 minutes

Materials required for examination

Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers

Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.

Higher tier candidates: answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

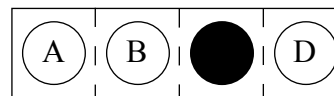
Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

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Turn over

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**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

Smoke-Free England

On July 1st 2007, all enclosed public places and workplaces in England became smoke-free.
This new law was introduced to ensure a healthier environment.



1. The new smoke-free law is likely to reduce the number of cases of
 - A influenza
 - B lung cancer
 - C tuberculosis
 - D liver disease

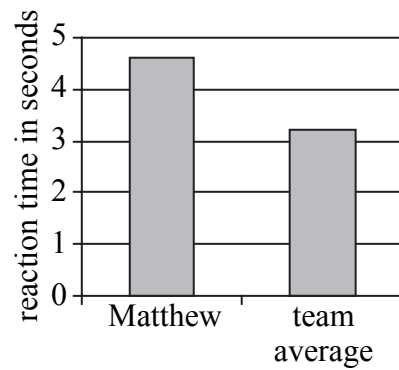
2. Cigarette smoke contains a substance that reduces the amount of oxygen that red blood cells can carry.
The name of this substance is
 - A carbon monoxide
 - B carbon dioxide
 - C tar
 - D nitrogen

3. Nicotine is the addictive substance in cigarette smoke.
The receptors responsible for addiction are found in the
 - A heart
 - B liver
 - C brain
 - D lungs

4. Smokers are more likely than non-smokers to get lung infections.
These lung infections are caused by microbes which are carried
 - A in blood
 - B in food
 - C by mosquitoes
 - D in air

Matthew's reactions

Matthew joined a local cricket team. His reaction time was measured and his results were plotted on a bar chart against the average reaction time of the rest of the team.



5. Matthew's reaction time was
- A faster than the team average
 - B slower than the team average
 - C the same as the team average
 - D twice the team average
6. To measure Matthew's reaction time the team captain used a
- A thermometer
 - B tape measure
 - C stopwatch
 - D heart rate monitor
7. Another reaction that can be measured is the eye's reaction to light. This reaction is known as
- A the pupil reflex
 - B the iris reflex
 - C the light reflex
 - D the lens reflex
8. A reflex action is also known as
- A a voluntary response
 - B an involuntary response
 - C an accommodation response
 - D a thinking response

A hospital visit

David was unwell.

His doctor sent him to the hospital to have a blood test.

At the hospital, the number of white cells and the concentration of antibodies in David's blood were measured.

The doctor compared David's results to those of a healthy person of the same age.

	white cells (cells/mm ³)	antibodies (mg/dm ³)
Healthy person	3000	2300
David	4500	3000

9. David's results are different from those of the healthy person because David needs
- A more white cells to destroy the antibodies
 - B more white cells to produce more antibodies
 - C more antibodies to produce more white cells
 - D more antibodies to produce antigens
10. Compared with the healthy person, the number of white cells in David's blood had increased by
- A 23%
 - B 30%
 - C 33%
 - D 50%
11. Some white cells contain chemicals that break down foreign particles. The same chemicals are found in tears. These chemicals are known as
- A pathogens
 - B hormones
 - C lysozymes
 - D antigens

12. The following statements describe what happens when we cut ourselves. They are not in the correct order.

- 1 inflammatory response seals off the wound
- 2 physical barriers against disease are broken
- 3 white cells produce antibodies which give us immunity
- 4 white cells ingest microbes

Which of the following shows the correct order

- A** 2 → 1 → 4 → 3
B 2 → 3 → 1 → 4
C 1 → 3 → 2 → 4
D 1 → 4 → 3 → 2

Epilepsy

Epilepsy is a disorder of the brain which can cause seizures.

A seizure usually causes a change in behaviour when the brain's nerve cells misfire and generate a sudden, uncontrolled increase in activity in the brain.

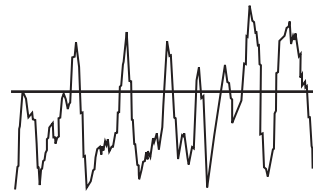
13. Epilepsy affects the central nervous system which is made up of the

- A** brain only
B spinal cord only
C sensory neurones only
D brain and spinal cord

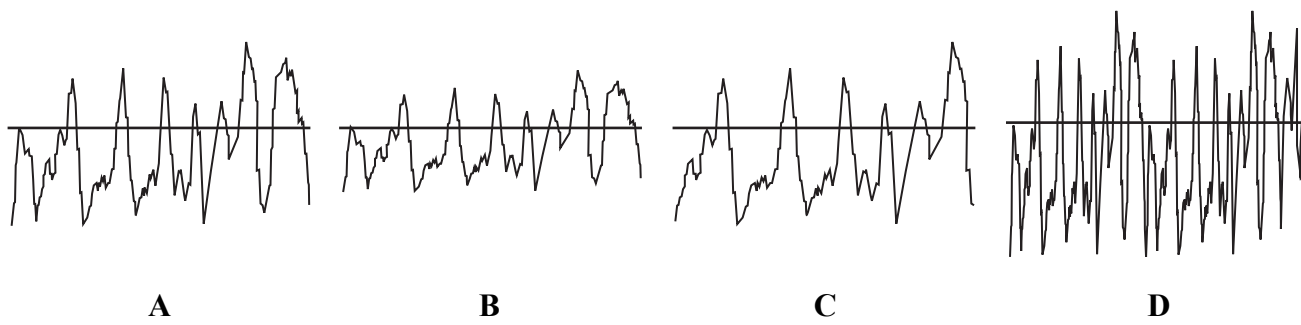
14. Nerve impulses in brain cells are transmitted by

- A** electrical signals
B enzymes
C hormonal messages
D diffusion

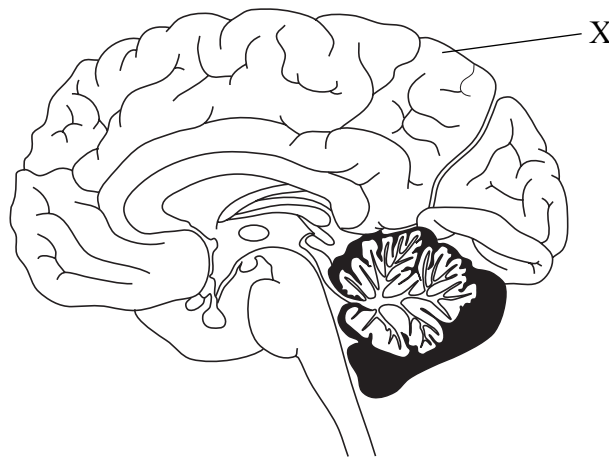
15. An EEG (electroencephalograph) can be used to measure the amount of activity in the brain. This is the EEG of a person who does not suffer from epilepsy.



Which EEG is most likely to be that of a person suffering from an epileptic seizure?



16. The region of the brain affected by epilepsy is indicated by X. What is the name of region X?



- A cerebral cortex
- B cerebellum
- C hypothalamus
- D pituitary gland

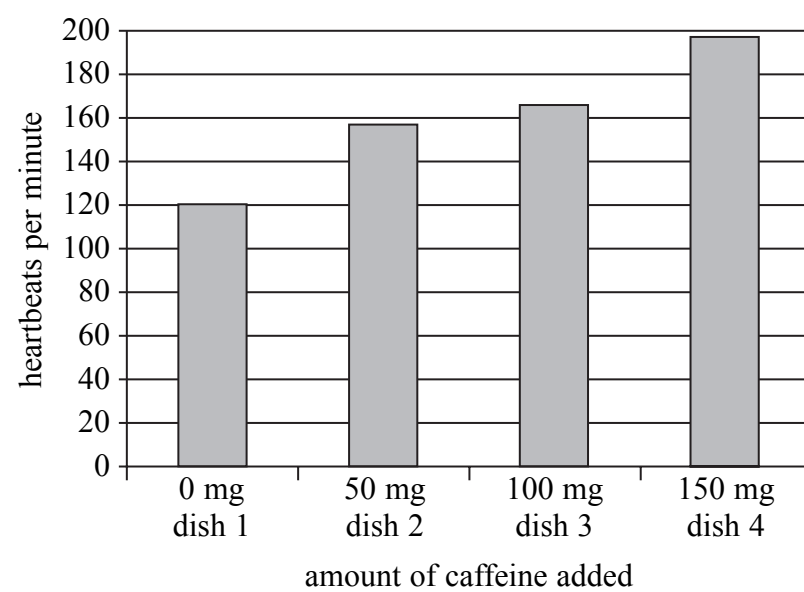
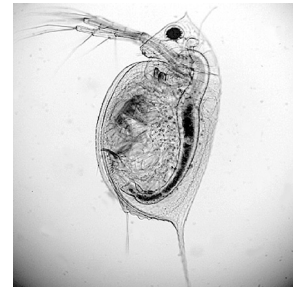
**Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier.**

Caffeine and *Daphnia* heart rate

Sarah investigated the effect of caffeine on the heart rate of *Daphnia* (water flea).

She placed three *Daphnia* into each of 4 petri dishes containing pond water. No caffeine was added to dish 1 and different amounts of caffeine were added to the other 3 dishes.

She recorded the heart rate of each *Daphnia* for one minute.



17. The graph shows that the heart rate of the daphnia
- A increased steadily as the concentration of caffeine increased
 - B increased less between 50 mg and 100 mg than it did between 100 mg and 150 mg
 - C increased more between 50 mg and 100 mg than it did between 100 mg and 150 mg
 - D was not affected by the addition of caffeine
18. The control for this experiment was dish
- A 1
 - B 2
 - C 3
 - D 4

19. The results of Sarah's test were made more reliable because she
- A used different daphnia for each test
 - B used a video-microscope to record the heart rate
 - C repeated the experiment 3 times
 - D kept the pond water at a constant temperature

20. The investigation shows that caffeine is a
- A painkiller
 - B depressant
 - C sedative
 - D stimulant

Insulin may be harmful

New research indicates that too much insulin in your body may be bad for the brain and may be a cause of Alzheimer's disease. The research has been carried out on mice. More research is needed to see if the results are the same in human volunteers.

21. Why do scientists usually start their tests on small mammals such as mice?
- A mice have exactly the same responses as humans
 - B mice are mammals and reproduce rapidly
 - C mice are able to survive all testing procedures
 - D mice are unable to feel pain
22. Where in the body is insulin produced?
- A intestine
 - B liver
 - C pancreas
 - D stomach
23. The main role of insulin in the body is to regulate the conversion of
- A glycogen into glucose
 - B glucagon into glucose
 - C glucose into glycogen
 - D glucose into glucagon

24. Insulin is carried around the body
- A in the plasma
 - B attached to platelets
 - C bonded to red blood cells
 - D within white blood cells

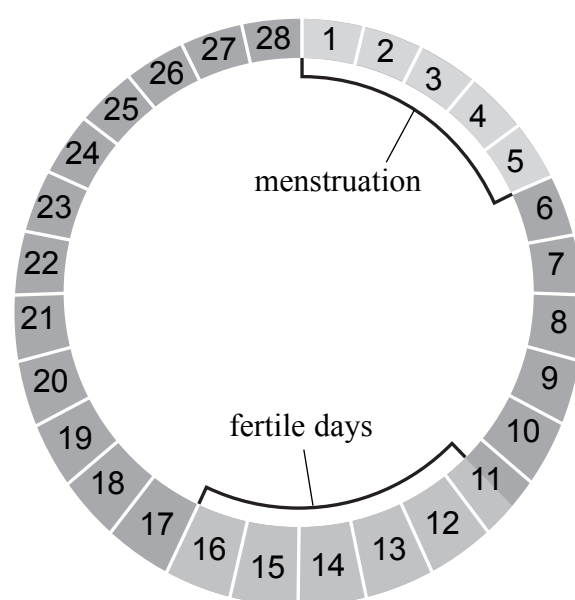
TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Foundation tier candidates do not answer any more questions after question 24.

**Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.**

The menstrual cycle

The menstrual cycle is shown by the diagram and is controlled by female hormones.



25. What is occurring inside the female body between day 6 and day 10?
- A lining of the uterus is being shed and ova are ripening
 - B lining of the uterus is building up and ova are ripening
 - C lining of the uterus is being shed and progesterone levels are increasing
 - D lining of the uterus is building up and oestrogen levels are decreasing
26. During which part of the cycle does ovulation usually occur?
- A 0 to 5 days
 - B 6 to 10 days
 - C 11 to 16 days
 - D 17 to 28 days
27. Which row of the table correctly shows the concentration of hormones during menstruation?

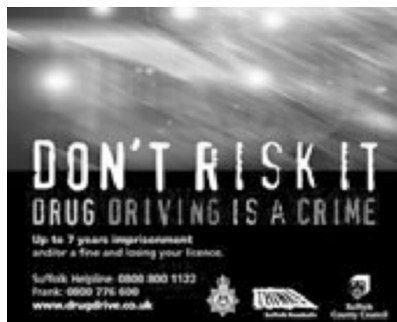
	oestrogen concentration	progesterone concentration
A	low	low
B	low	high
C	high	low
D	high	high

28. If a woman becomes pregnant, menstruation does not occur because
- A progesterone concentrations remain high
 - B progesterone concentrations decrease rapidly
 - C oestrogen concentrations remain high
 - D oestrogen concentrations decrease rapidly

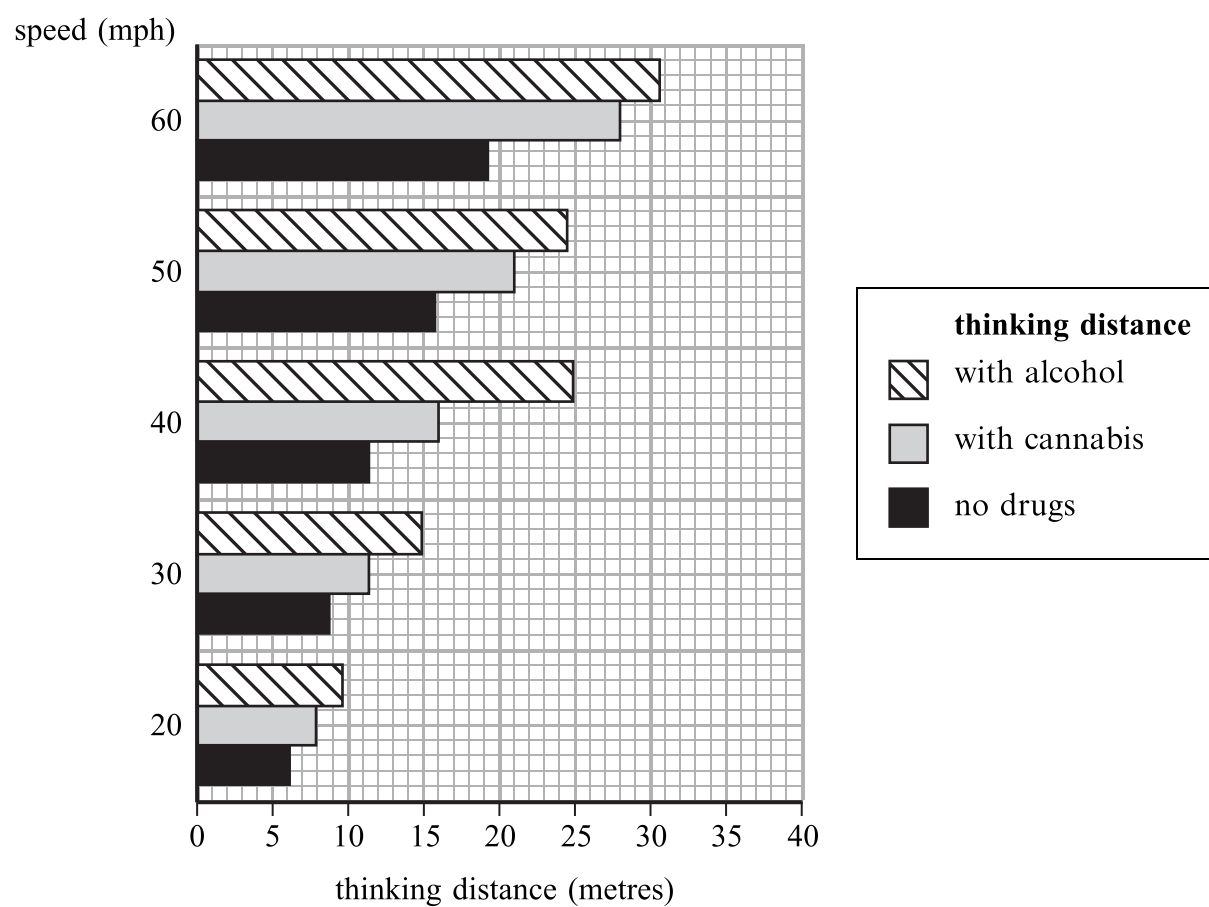
Drug driving

In 2006, a London wide campaign was launched, aiming to reduce the number of people driving under the influence of drugs.

Road tests were carried out and thinking distance measured. Thinking distance is the distance that a car travels after the driver has seen a hazard and before starting to brake. The thinking distance depends on how quickly the driver reacts.



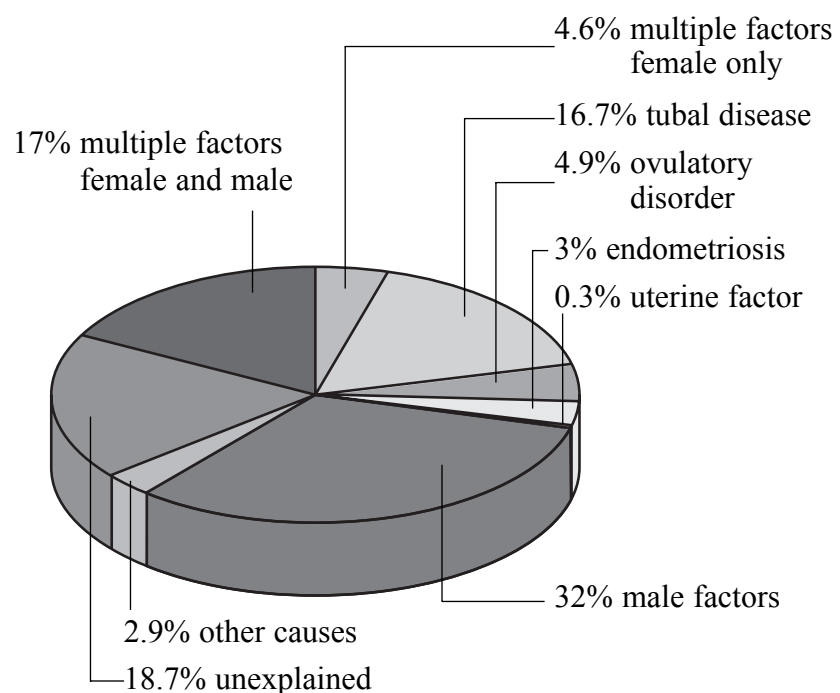
The road tests were carried out using the same drivers when they were under the influence of alcohol, then cannabis and then no drugs.



29. The data from the graph shows that
- A cannabis decreases thinking distance at all speeds
 - B thinking distance under the influence of alcohol is greater at lower speeds than at higher speeds.
 - C under the influence of cannabis, the thinking distance at 40 mph is double that at 20 mph
 - D under the influence of alcohol, the thinking distance at 40 mph is double that at 20 mph
30. The results from the road tests indicate that cannabis and alcohol
- A decrease reaction times and are stimulants
 - B increase reaction times and are stimulants
 - C decrease reaction times and are depressants
 - D increase reaction times and are depressants
31. The statements below are about the use of cannabis.
- 1 Cannabis can be used to stimulate the appetite of AIDS patients.
 - 2 Smoking cannabis is harmful to health.
 - 3 Cannabinoids in cannabis give pain relief.
 - 4 Taking cannabis can lead to the use of 'harder' drugs.
- Which of the statements might be reasons for doctors **not** supporting the legalisation of cannabis?
- A 1 and 3 only
 - B 1 and 4 only
 - C 2 and 3 only
 - D 2 and 4 only
32. Morphine is a depressant and it can be used to relieve pain in terminally ill patients. Which of the following describes how morphine relieves pain?
- A It binds to the membrane of the synapse which increases communication between neurones.
 - B It binds to the membrane of the synapse which decreases communication between neurones.
 - C It binds to motor neurones which prevents pain messages reaching the brain.
 - D It blocks pain receptors in the skin which prevents pain messages reaching the brain.

Infertility

The pie chart shows the causes of infertility among couples having IVF treatment.



33. The number of couples who were given IVF due to infertility was 100 000. Based on the information in the pie chart how many of these cases were unexplained?

A 187
B 1 870
C 18 700
D 187 000

34. Low sperm count is thought to be caused by the presence in males of the female hormone called

A adrenalin
B insulin
C oestrogen
D testosterone

35. IVF treatment involves the fertilisation of an ovum by a sperm

A *in vivo*
B *in utero*
C *in vitro*
D *in vacuo*

- 36.** 'Mature clients' for IVF are women over the age of 50.
Some people are concerned by the use of IVF in mature clients because they
- A** have a lower income than younger clients
 - B** have a higher success rate with IVF
 - C** have more time to look after children
 - D** are more likely to be ill and unable to care for children

Tuberculosis (TB)

According to the World Health Organisation (WHO) a new, untreatable form of TB is affecting 30,000 people a year. Extensively drug-resistant TB (XDR-TB), a form virtually resistant to antibiotics, emerged in 2006. An outbreak in South Africa last year confirmed the WHO's fears about XDR-TB. Out of a total of 53 patients, who were mainly carriers of the HIV virus, 52 died.

- 37.** The increase in XDR-TB is partly due to
- A** patients not completing their treatment
 - B** patients carrying TB being isolated
 - C** reliable drug supplies being used to treat all forms of TB
 - D** adequate immigration controls
- 38.** HIV is a virus that attacks the immune system, destroying white blood cells that are involved in the third line of defence against disease.
HIV patients are more likely to contract TB because
- A** they cannot produce white cells to ingest the TB antigens
 - B** they cannot produce enough antibodies to destroy the TB antigens
 - C** they produce antibodies against the TB antigens but not against the HIV antigens
 - D** HIV attacks white cells involved in the inflammatory response
- 39.** The introduction of DOTS in 1991 has reduced the number of deaths from TB.
This is because DOTS
- A** patients do not need to be watched whilst taking their medication
 - B** has eliminated cases of the disease in many areas
 - C** patients do not become re-infected with TB
 - D** has helped to prevent mutant forms of TB from arising

- 40.** TB is widespread in South Asia.
The most likely reason for this is because
- A** TB is more likely to mutate in hotter climates
 - B** water treatment programs are too expensive to implement
 - C** overcrowding and poverty lead to higher transmission rates
 - D** the DOTS program is used in poorer countries

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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