

PMT Education - BioMedical Admissions Test

SECTION 2 - Scientific Knowledge and Applications

PMT Mock Paper Set A

30 minutes

Instructions to Candidates

This paper is Section 2 of 3. Your supervisor will collect this question paper and answer sheet before giving out Section 3.

A separate answer sheet is provided for this section. Please check you have one. You also require a soft pencil and an eraser.

Please complete the answer sheet with your:

- BMAT candidate number
- Centre number
- Date of birth
- Name

Speed as well as accuracy is important in this section. ***Work quickly, or you may not finish the paper.*** There are no penalties for incorrect responses, only marks for correct answers, so you should attempt ***all*** 27 questions.

Each question is worth **one** mark.

Answer on the sheet provided. Questions ask you to show your choice between options by shading a circle. If you make a mistake, erase thoroughly and try again.

Any rough work should be done on this question paper.

Calculators are NOT permitted.



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- 1 Luca has haemophilia, a genetic disorder which impairs the body's ability to form clots and control bleeding. It is a sex-linked recessive disorder. He is hoping to have a baby with his partner Iva. Iva neither has haemophilia nor is a carrier of the trait.

What is the chance that their baby will have haemophilia or be a carrier? You may want to draw out a monohybrid cross to help you.

- A A son will have a 50% chance of being a carrier, while a daughter will have a 75% chance of being a carrier.
- B The baby will not be affected.
- C All daughters will be unaffected and 50% of sons will be carriers.
- D All daughters will be unaffected and all sons will be carriers.
- E All sons will be unaffected and all daughters will be carriers.
- F All sons will be unaffected, but the daughters will have a 50% chance of being a carrier and 50 % chance of being unaffected.

- 2 Element X has a mass number of 35 and an atomic number of 17.

Which of the following statements are correct?

- 1 The nucleus has a relative mass of 17.
 - 2 X is a noble gas.
 - 3 X forms an ion with a charge of -2.
 - 4 It is in group 17 of the periodic table.
 - 5 Element X will react with Ca to form a salt CaX.
-
- A 4 only
 - B 5 only
 - C 3 and 5 only
 - D 4 and 5 only
 - E 2 and 5 only
 - F 2, 4 and 5 only



- 3 Two electrical insulators are rubbed together.

Which of the following statements are true?

- 1 The insulator that loses electrons is positively charged.
 - 2 The insulator that loses electrons is negatively charged.
 - 3 The two insulators disperse charge easily.
 - 4 The two insulators do not disperse charge easily.
- A** 1 and 3 only
B 1 and 4 only
C 2 and 3 only
D 2 and 4 only
- 4 Sam earned a gross total of £2460 last month from hiring out 3 different sized hoverboards to the public. From this, he (then) had to pay maintenance: he paid 10% of the cost of hire from the 1 person hoverboard, 20% of the cost of hire from the 2 person hoverboard, 30% of the cost of hire from the 3 person hoverboard. The 3 person hoverboard costs twice as much to hire as the 1 person hoverboard.

Given that the total cost of maintenance was £540, calculate the cost of hire for each hoverboard.

	1 person hoverboard	2 person hoverboard	3 person hoverboard
A	1020	480	2040
B	360	500	720
C	480	1020	960
D	400	1000	800
E	480	510	960



5 Which of the following statements are true of respiration?

- 1** While respiration does not happen in plants, it happens in every human cell.
- 2** Anaerobic respiration is the most efficient method of releasing energy from glucose.
- 3** Respiration can be used to make macromolecules like proteins from amino acids.
- 4** Enzymes involved in respiration have an optimum pH and temperature at which they function most effectively, and in the human body the optimum temperature is normally around 37°C.

- A** 1, 2, 3 and 4
B 1, 3 and 4
C 2, 3 and 4
D 3 and 4
E 2 and 3
F 1 and 2
G 3 only

6 Which of the following statements regarding bonding is/are true?

- 1** KCl has stronger ionic bonds than CaCl_2 .
- 2** NaCl has stronger ionic bonds than KCl.
- 3** Graphite is a giant ionic structure which only conducts electricity when it is dissolved or molten.

- A** 1 only
B 2 only
C 3 only
D 1 and 2 only
E 1, 2 and 3



- 7 A 35V cell is placed in a series circuit with a light bulb with a resistance of 10Ω and a speaker with a resistance of 15Ω .

What is the current flowing through the circuit in amperes?

- A 170
 - B 14
 - C 1.4
 - D 875
 - E 87.5
- 8 David bought some stamps for his collection. He bought them for £52 and sold them years later for £65.

Find the percentage increase in value.

- A 25%
 - B 13%
 - C 125%
 - D 20%
 - E 26%
- 9 Which of the following statements about the nervous system is correct?
- A In a reflex action, impulses are sent from a sensory neuron to the CNS and then to a motor neuron much faster than normal, because it is an innate automatic response.
 - B The peripheral nervous system consists of the spinal cord and motor and sensory neurons, while the CNS is located in the brain.
 - C Neurons make direct contact with one another.
 - D Input from the CNS is important for maintaining homeostasis.



10 Listed below are the electronic configurations for atoms of different elements. Which one represents the most reactive non-metal?

- A** 2,8,1
- B** 2,8,7
- C** 2,2
- D** 2,8,8,7
- E** 2,8,6

11 A sound wave travelling in air enters a glass block at an angle 30° to the surface of the material.

Which of the following statements are true?

- 1** The speed of the wave decreases.
- 2** The angle of refraction is greater than the angle of incidence.
- 3** The angle of incidence is greater than the angle of refraction.
- 4** The speed of the wave increases.

- A** 1 only
- B** 1 and 2 only
- C** 1 and 3 only
- D** 2 and 4 only
- E** 3 and 4 only
- F** 4 only

12 Alexander mixes 800g of cement with 2.8kg of sand.

Express the ratio of cement to sand in its simplest form.

- A** 20:7
- B** 2000:7
- C** 1:3.5
- D** 7:2
- E** 2:7



13 Which one of the following best describes the role of the stomach in the digestive system?

- A The stomach produces protease, lipase and amylase to begin the breakdown process.
- B Pepsin is produced, which begins the breakdown of starch into maltose.
- C Hydrochloric acid is produced to provide an optimum environment for gut bacteria.
- D The stomach produces hydrochloric acid to maintain the pH of 3.
- E It churns food with its muscular walls in order to aid breakdown, pepsin is also produced.

14 Which of the following reactions show a feasible displacement reaction?

- 1 $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{NaCl}(\text{s}) \rightarrow \text{PbCl}_2(\text{aq}) + 2\text{NaNO}_3(\text{aq})$
- 2 $2\text{AgNO}_3(\text{aq}) + \text{Zn}(\text{s}) \rightarrow 2\text{Ag}(\text{s}) + \text{Zn}(\text{NO}_3)_2(\text{aq})$
- 3 $\text{I}_2 + 2\text{KI} \rightarrow 2\text{KBr} + \text{I}_2$
- 4 $\text{Cl}_2 + 2\text{NaBr} \rightarrow 2\text{NaCl} + \text{Br}_2$

- A 1 only
- B 4 only
- C 1 and 3 only
- D 1 and 2 only
- E 1 and 4 only
- F 2 and 4 only

15 A series circuit is composed of a light bulb and a 20V cell. The light bulb produces 1.3kJ of energy in 3 minutes.

What is the overall current in the circuit in amperes?

- A 21.7
- B 0.0005
- C 0.022
- D 5
- E 0.5



- 16 The area of the shape below is $3 + 4x \text{ units}^2$. Calculate the value of x

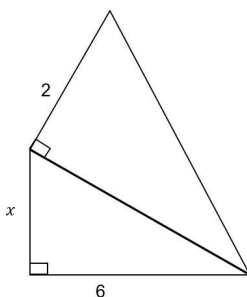


Diagram not drawn to scale

- A** 4.5
B 3
C 2.5
D 1
E 0
- 17 Which of the following statements is true of the circulatory system?
- A** Humans have a single circulatory system.
B Humans have a double circulatory system, one entering the atria of the heart and one entering the ventricles.
C Blood leaves the right side of the heart to travel to the rest of the body.
D The left side of the heart contains deoxygenated blood.
E Humans have a double circulatory system, one entering the right side of the heart and one entering the left side of the heart.





- 18 The boiling points and electrical conductivity of 4 different substances are shown in the table below.

Substance	Boiling Point ($^{\circ}\text{C}$)	Strength as an electrical conductor
1	-90	Doesn't conduct
2	2500	Good conductor
3	2110	Doesn't conduct
4	1205	Conducts when molten

Which of the following options is the best description of the structures of 1, 2, 3 and 4 respectively?

- A Simple molecular, giant metallic, giant covalent, giant ionic lattice
 - B Simple molecular, giant ionic lattice, giant covalent, giant metallic
 - C Giant covalent, giant ionic lattice, simple molecular, giant metallic
 - D Giant covalent, giant metallic, simple molecular, giant ionic lattice
 - E Giant ionic lattice, simple molecular, giant covalent, giant metallic
- 19 Two non-identical resistors are arranged in parallel with a cell.

Which of the following statements are true?

- 1 The current is the same throughout the circuit.
 - 2 The voltage is the same throughout the circuit.
 - 3 The total current is the sum of the current in each branch of the circuit.
 - 4 The total voltage is the sum of the voltage in each branch of the circuit.
- A 1 and 2 only
 - B 2 and 3 only
 - C 2 and 4 only
 - D All of the statements



- 20** Rachel deposits a sum of money in a bank. If the interest rate decreases from 3.75% per annum to 3.5% per annum, Rachel's interest will decrease by £50 in a year.

Find the sum of money Rachel deposited.

- A** £200
B £20000
C £1333
D £1429
E £10000
- 21** The following are all events that can lead a species to extinction, except:
- A** Speciation.
B Rapid environmental change.
C A catastrophic event, such as a devastating earthquake.
D The introduction of a new disease or predator.
E Natural selection.
F The arrival of another species which outcompetes the first species for food.
- 22** A compound is found to contain N, H and O in the ratio 7:1:12. 800g of a gaseous sample of the compound would have a volume of 240dm^3 at room temperature and pressure.

Which formula (A-E) is the molecular formula for this compound?
(A_r : N = 14; H = 1; O = 16)

- A** $\text{N}_{14}\text{H}_2\text{O}_{24}$
B NH_2O
C $\text{N}_2\text{H}_4\text{O}_3$
D $\text{N}_2\text{H}_2\text{O}$
E $\text{N}_4\text{H}_8\text{O}_6$





23 Which one of the following statements are correct with respect to different types of decay?

- 1 The mass of the nuclei remains unchanged in alpha decay.
- 2 A high speed electron is emitted in beta positive decay.
- 3 Beta negative decay results in an ion being formed.

- A 1 only
B 2 only
C 1 and 2 only
D 1 and 3 only
E None of the above

24 A sum of money was divided between Raj, Emme and John in the ratio 2:3:5. Emme's share was £ 13.50.

What was the total sum of money?

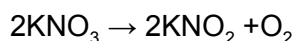
- A £ 45
B £ 67.50
C £ 27
D £ 40.50
E £ 90



- 25 The following statements describe Huntington's Disease.
- 1 Patients with Huntington's Disease experience neurological problems involving memory, concentration and mood.
 - 2 Huntington's Disease is caused by a dominant allele.
 - 3 Huntington's Disease follows the same inheritance pattern as polydactyly.
 - 4 Symptoms of Huntington's Disease most often appear in early childhood, as children start to attend school and fall behind in learning.
 - 5 Once someone has been diagnosed with Huntington's Disease, they can be cured.

Which of these statement(s) is/are incorrect concerning the genetic disorder?

- A 1, 2 and 3
 - B 2, 3 and 4
 - C 3, 4 and 5
 - D 1 and 2
 - E 3 and 4
 - F 4 and 5
 - G 4 only
 - H 5 only
- 26 Kelly is heating potassium nitrate for her chemistry coursework to produce potassium nitrite and oxygen gas.



She uses a gas syringe to measure the volume of oxygen gas evolved and notes the reading at 1dm^3 .

What mass of potassium nitrate must Kelly have heated to produce this volume of oxygen at rtp?

(A_r : N=14 O=16 K=39)

- A 6.36g
- B 7.36g
- C 8.42g
- D 9.21g
- E 10.1g



27 The following statements are about thermal physics.

- 1** Thermal radiation travels at the speed of light.
- 2** Thermal radiation requires a medium to travel.
- 3** Heat is transferred to earth through thermal radiation.
- 4** Infrared radiation is not seen by the eye.
- 5** Any object, regardless of its temperature, emits thermal radiation.

Which of these statements are correct?

- A** 1, 2, 3 and 4
- B** 1, 2, 3 and 5
- C** 1, 2 and 4
- D** 1, 3 and 4
- E** 2, 3 and 5
- F** 1 and 2
- G** 1 and 4
- H** 3 and 4

