ADMISSION TEST FOR THE DEGREE COURSE IN MEDICINE AND SURGERY

Sample Paper

Thinking Skills and General Knowledge

1 Approximately 1 in 14 men over the age of 50 has prostate cancer. The level of 'prostate specific antigen' (PSA) is used as a preliminary screening test for prostate cancer.

7% of men with prostate cancer do not have a high level of PSA. These results are known as 'false negatives'.

75% of those men with a high level of PSA do not have cancer. These results are known as 'false positives'.

If a man over 50 has a normal level of PSA, what are the chances that he has prostate cancer?

A 0.7%

B 0.5%

C 5%

D 7%

E 25%

2 Three friends, Adam, David and Sue are sharing out a bag of marbles. To do this more quickly, they take 10 marbles each time and repeat until the bag is empty. There are not enough marbles for Sue to take 10 on the last turn. Adam and David then give her two marbles each and they all have the same.

How many marbles did Sue take on the last turn?

A 4

B 2

C 3

D 6

E 8

3 Tom shared out some money between his three children in the ratio 5:3:2. He later had an extra €6 which he gave to the child who received the least originally. This meant that the money had been shared into one large and two equal smaller shares.

How much money in total did Tom give to the three children?

A €66

B €20

C €26

D €36

E €60

4 Three months ago, Jane had 5 times as many DVDs as Duncan. Since then they have both bought 12 more DVDs. Jane now has twice as many as Duncan.

How many DVDs does Jane have now?

A 32

B 42

C 52

D 62

E 72

5 There are four rivers in Bolandia, each claiming to be the longest. Tourist board brochures in the regions containing the rivers, make the following statements:

1. The Dile is shorter than the Cubba.

2. The Bongo is shorter than the Esun.

3. The Esun is longer than the Cubba.

If all of the above are correct, which one of the following statements is definitely true?

A The Esun is longer than the Dile.

B The Dile is shorter than the Bongo.

C The Cubba is longer than the Bongo.

D The Dile is longer than the Esun.

E The Bongo is longer than the Cubba.

6 The table below shows the number of people who voted for each candidate in the recent school election:

Name	Alison	Harold	Kevin	Peter	Rachel
Votes	84	100	72	126	63

When drawing a pie chart of the results one of the numbers above was not read correctly (the other four were correct). The angles were calculated as 113.4 degrees, 90 degrees, 75.6 degrees, 56.7 degrees, and 24.3 degrees.

Whose score was copied incorrectly when the pie chart was constructed?

A Kevin

B Alison

C Harold

D Peter

E Rachel

7 A regular train service operates between Jayford and Kayton, a 16 km journey which takes 19 minutes. The trains travel at a constant speed of 60 km per hour in both directions except through a tunnel, where they are limited to 20 km per hour. Trains travelling towards Kayton enter the tunnel 4 km after setting off from Jayford.

How long is the tunnel?

A 1.5 km

B 0.5 km

C 2.5 km

D 3.5 km

E 4.5 km

8 After a long period of dry weather, the water container in my garden contained only 28% of its capacity of water. Last week's rain, however, increased the amount of water in the container by 25%, and according to the weather forecast, a similar amount of rain is expected to fall this coming week.

If, as expected, the container gets the same amount of rainwater this coming week as it did last week, what percentage of its capacity will it then contain?

A 42.00%

B 43.75%

C 60.00%

D 66.25%

E 78.00%

9 A student gives his friends small, short-term loans for periods of 1, 2 or 3 weeks after which time they must be repaid in full. He always lends on a Friday afternoon. He starts with €120 and loans out the following amounts each week:

Week	1	2	3	4
Amount	€45	€25	€18	€20

What is the smallest amount of money he has by the end of the 4th Friday?

A €57

B €12

C €77

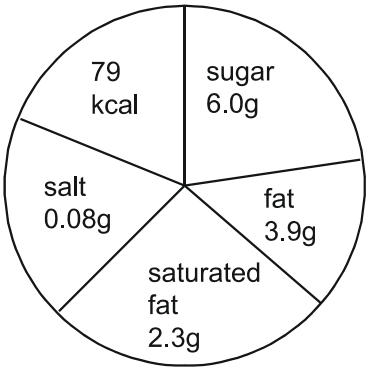
D €82

E €100

10 The following information appears on a 200g packet of biscuits:

Typical values per 100g:		
Energy	Kj	2137
	Kcal	510
Protein		5g
Carbohydrate		65.7g
of which sugars		38.5g
Fat		25.3g
of which saturates		14.6g
Fibre		1.7g
Sodium		0.21g
Equivalent as salt		0.52g

Each biscuit contains:



How many biscuits are there in a full packet?

A 13

B 6

C 7

D 11

E 22

11 In a street, a survey showed that out of a hundred households 60 had a cat, 40 had a dog, and 20 had neither a cat nor a dog.

How many households had a cat but no dog?

A 40

B 10

C 20

D 30

E 50

12 The volume of water expands by 9% when it freezes.

If you want a block of ice 40 cm³, how much water would you need to put into a freezer?

A 36.7 cm³

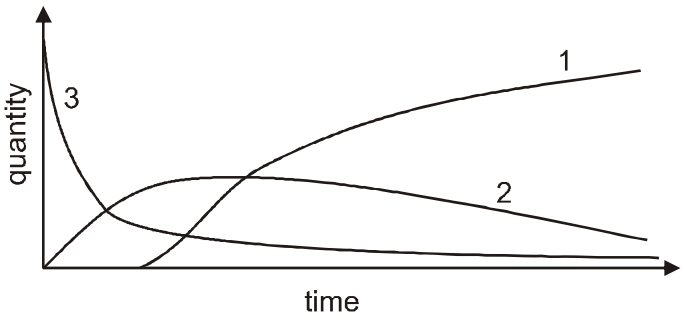
B 40.0 cm³

C 38.2 cm³

D 38.0 cm³

E 37.0 cm³

13 One radioactive substance, P, is gradually changed by radioactive decay into another, Q. Q itself decays into a third substance, R, which does not decay. The graphs below show how the quantities of P, Q and R varied with time during an experiment.



What do the graphs 1, 2 and 3 represent?

A 1:R 2:Q 3:P

B 1:P 2:Q 3:R

C 1:Q 2:P 3:R

D 1:Q 2:R 3:P

E 1:R 2:P 3:Q

14 Which of the following states is NOT a permanent member of the UN Security Council?

A Japan

B France

C China

D United Kingdom

E USA

15 Which ancient Greek is referred to as the father of Western medicine?

A Hippocrates

B Aristotle

C Aristophanes

D Plato

E Socrates

16 Amnesty International (AI), a non-governmental organisation for the protection of human rights enshrined in the Universal Declaration of Human Rights, opposes the death penalty. Which one of the following reasons for opposing the death penalty is inconsistent with the principles of AI.

A The death penalty is contrary to theological principles.

B The death penalty can be carried out on an innocent person.

C The death penalty is cruel, inhuman and degrading.

D The death penalty is not a deterrent against crime.

E The death penalty, once carried out, cannot be reversed.

17 The polis is the most important institutional expression of the classical Greek way of life. What type of state is it?

A A city state

B A federal state

C A modern state

D A monarchical state

E A tyrannical state

18 Which set of statements about Dante Alighieri is correct?

A he was from Florence, wrote poetry, died before 1400

B he was from Milan, was born in the thirteenth century, died before 1400

C he was from Milan, was the son of Giulia Beccaria, wrote poetry

D he was from Tuscany, wrote poetry, was the son of Giulia Beccaria

E he was of noble family, was born in the fourteenth century, wrote tragedies

19 Modern technology has given us the power to use renewable natural resources faster than they can be replaced. The decline of fish numbers provides one example of the way in which modern technology can rapidly use up a natural resource. Modern fishing ships equipped with fish detecting systems and huge nets can gather up vast quantities of fish quicker than the sea can renew them. Because high technology gives us such harmful powers, we must learn to use the renewable resources of the earth carefully, rather than waste them.

Which one of the following best expresses the main conclusion of the above passage?

A Humans must preserve renewable resources by learning how to use them carefully.

B Fish need to be carefully protected to prevent them from being destroyed.

C Modern technology simply takes from the environment and destroys its resources.

D Most people are unaware of the damaging effects of modern technology.

E Fishing is now a serious threat to the world's environment and should cease.

20 Shower gel is now used much more than soap when people take a shower. This is unfortunate. Shower gel requires much more packaging which means more rubbish. There is also a tendency for people to use more of it when washing in comparison with soap. Therefore more natural resources are consumed in the manufacturing process than would be if people used only soap. So, the trend towards shower gel is bad for the environment. This is because it creates more problems of waste disposal and uses up more resources than soap. We should make people more aware of the environmental impact of such simple decisions.

Which one of the following is an expression of the main conclusion of the above argument?

A People should be made more aware of the environmental consequences of choosing shower gel.

B It is unfortunate that shower gel has become more popular than soap.

C The manufacture of shower gel is more wasteful of natural resources.

D The increased popularity of shower gel is bad for the environment.

E The use of shower gel increases the problems of waste disposal.

21 The Chief Executive of the Royal Opera House has recently offered 100 seats on any Monday night for £10. Normally these seats can cost up to £175 therefore it represents a considerable saving. However the hopes of the Chief Executive that this will attract a broader audience are likely to be disappointed. It is not the financial costs that put people off opera - it is simply that they do not like it. Many young people spend considerable sums of money going to premier football matches or 'clubbing'. This suggests, therefore, that the problem of attracting a more diverse audience to opera is more a question of culture than economics.

Which one of the following is an expression of the main conclusion of the above argument?

A The 'cheap seats' policy is unlikely to attract a more diverse audience.

B The intention of the 'cheap seats' policy is that it will attract a broader audience.

C Attracting a broader audience for opera is a problem of taste rather than expense.

D Many young people do not like the idea of going to the opera.

E A considerable amount of money can be saved as a result of this offer.

22 Health services should find better ways to take blood pressure readings for patients thought to be suffering from high blood pressure (hypertension). One third of patients thought to have high blood pressure may actually have 'white coat' hypertension, according to a new study. 'White coat' hypertension means that a patient's blood pressure is high at the doctor's surgery, probably due to anxiety, but normal in everyday life. In the study, patients said to have hypertension had their blood pressure measured in a normal environment; more than one third of these patients' blood pressures were in the normal range when they were at home or participating in their usual activities. It is worrying that patients are being treated with drugs with some negative side effects to reduce high blood pressure which they do not actually have.

Which one of the following best expresses the conclusion of the argument above?

A More effective ways of measuring blood pressure are needed.

B 'White coat' hypertension has no medical significance.

C Anxiety is the most common cause of high blood pressure.

D Two thirds of patients said to have hypertension are being wrongly treated.

E Health services could save money currently spent on unnecessarily prescribed drugs.

23 Ten years ago in many European cities, offices typically had spaces for six bicycles, half of which were never used and spaces for 50 cars which were always full. Today, there are fewer car spaces and many more spaces for bicycles which are always full. This change to cycling may seem strange to some as cycling is more effort. Possible causes are rising fuel prices, the introduction of higher parking charges for drivers in major cities, increasing awareness of environmental issues, expensive public transport and traffic jams.

Which one of the following can be drawn as a conclusion from the above passage?

A More people cycle to work now than 10 years ago.

B Using a bicycle is now the most popular way of travelling to work.

C Travellers are now much more environmentally aware than they were 10 years ago.

D People will not cycle to work unless employers provide more cycle spaces on site.

E Travellers are now less happy to pay the costs of car use than they were ten years ago.

24 Child actors tend to become addicted to drink and drugs in later life, usually when they become adults but are not as successful as they were previously. The actors frequently blame their parents, who often manage their children's career and so have a reason to work them hard when they are young and enjoy the wealth their children generate for them. The child actors who avoid this are often the ones who were encouraged to keep up their schooling and explore other career options.

Which one of the following can be drawn as a conclusion from the above passage?

A Child actors should have other interests that allow for other career opportunities.

B Parents should not be allowed to manage the careers of their children.

C Young actors who continue to work live happy, healthy lives.

D Drug abuse is common in the entertainment industry.

E There are fewer jobs available for adult actors.

25 Nicotine chewing gum is already available in chemists. Nicotine is an addictive drug, but by itself it causes little, if any, harm. Unlike other addictive substances it does not reduce the brain's performance, make people lazy, anti-social, or have more accidents. But until recently nicotine has been taken only in the form of tobacco, which also contains cancer-causing chemicals and deadly gases that kill one third of the people who smoke it. The chewing gum does not contain these chemicals, and is not dangerous in any other way.

Which one of the following is a conclusion which can be drawn from the above passage?

A Nicotine chewing gum is a relatively safe alternative to tobacco for those addicted to nicotine.

B Nicotine chewing gum should be banned as it is addictive.

C Tobacco companies should put money into the manufacture and marketing of nicotine chewing gum.

D Tobacco smokers can get rid of their addiction by chewing nicotine gum.

E Nicotine chewing gum will make nicotine addiction more common by removing some of its risks.

26 Roughly 60 percent of today's world population is bilingual or multilingual and it is argued that this is a new phenomenon. Today Spanish and Arabic are widely spoken whilst English is the world's most commonly spoken and written language. However, 500 years ago it was Latin which was the main language of education, religion, commerce and government in the Western World despite this not being most people's first language. In the 17th century, French and Italian gained in importance as languages of international trade.

Which one of the following can be drawn as a conclusion of the above passage?

A Speaking another language has always been an important practical consideration.

B English is the most common world language today because of the spread of the internet.

C The number of bilingual or multilingual people in the world will continue to grow.

D English will one day be replaced as the main language of communication.

E The majority of bilingual or multilingual people speak English.

27 Television programmes that show young people in a school environment continue to feature highly in viewing schedules. Few of the programmes, however, give any emphasis on the time spent studying and the work required for academic success. Many of the actors used are far older than the characters they portray, suggesting attitudes, behaviour and appearances that are inaccurate and sometimes inappropriate. Broadcasters and producers should try to correct this.

Which one of the following must be assumed in the above argument?

A It is important to represent school life accurately.

B Television programmes about other areas such as the police are not accurate.

C School work and academic success are important to all students.

D It is often impractical to use young people in television programmes given the restrictions on how many hours they can work.

E Young people may feel that their social life is dull compared with that shown in television programmes.

28 Global warming is threatening the survival of California's redwoods. These trees benefit from coastal fog which is captured by the trees, causing water to drip onto the soil and therefore watering them. Since fog is now 30 percent less frequent than it was 50 years ago the trees will not have this source of water and are therefore likely to begin to die out.

Which one of the following must be assumed in the above argument?

A Global warming is to blame for the reduction in coastal fog.

B Rainfall has also reduced over the past 50 years.

C Redwoods in other areas of the world are being similarly affected.

D The levels of fog will continue to decline.

E Other trees will not be able to thrive in these conditions.

29 According to the Food Standards Agency, film goers should be told how many calories there are in the popcorn, ice cream and fizzy drinks that they buy in cinemas and smaller portions of popcorn and drinks should also be available. As two thirds of adults and a third of children are already obese or overweight, with serious risk of heart disease, diabetes and cancer, the need for proper labelling to warn people about the calorie content of these items is urgent.

Which one of the following, if true, most strengthens the argument in the passage above?

A Trials show that consumers alter their eating habits when food is calorie-labelled.

B Cinemas rely on sales of food and drink to boost their profits.

C A large box of salted popcorn contains as many calories as a three course meal.

D Many people think that the food and drink consumed at the cinema is as important to the visit as the film.

E People who are overweight are sometimes more concerned with their looks than the long term health risks.

30 Rating figures for music are now much more difficult to calculate compared to a decade ago. The introduction of new formats for selling music means that figures have to be calculated based on more methods such as downloads, in addition to the sales of CDs in shops. Additionally, the availability of more formats means that there is more potential for copies of works to be shared with other fans, who do not pay for them. These fans do not show up in the ratings, so the official ratings do not reflect the relative popularity of a work.

Which one of the following, if true, would most strengthen the above argument?

A The sharing of works with other fans is more widespread for certain types of music.

B Sharing copies of purchased works with others is against the law.

C The calculation of ratings based on downloads and sales together is not difficult.

D Artists are not interested in the popularity of their work, just the sales figures.

E Official ratings have never reflected popularity very well.

Biology

31 The following organelles are involved in processing amino acids into glycoprotein:

1. Golgi apparatus
2. Ribosomes
3. RER

Which sequence is correct for this process?

A 2 → 3 → 1

B 1 → 3 → 2

C 2 → 1 → 3

D 3 → 1 → 2

E 1 → 2 → 3

32 Which of the following transport mechanisms require the use of protein molecules found in membranes and ATP?

1. Active transport
2. Diffusion
3. Facilitated diffusion

A 1 only

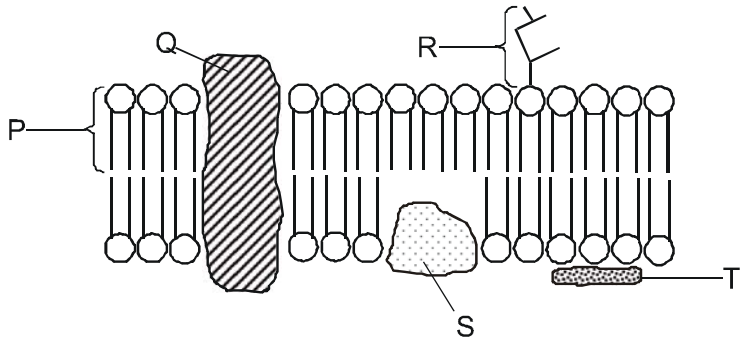
B 2 and 3 only

C 3 only

D 1 and 2 only

E 1 and 3 only

33 The diagram below represents the fluid mosaic model of the cell (surface) membrane.



Only two of the labelled molecules have both hydrophobic and hydrophilic areas. Which two molecules are they?

A P and Q

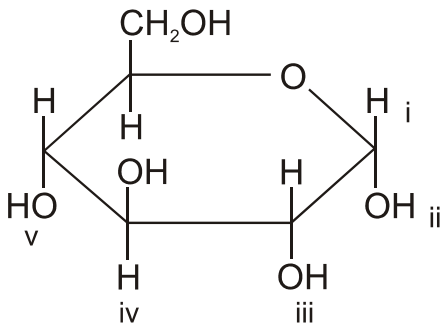
B P and T

C R and S

D S and T

E Q and R

34 If a glucose molecule became incorporated as a non-terminal component of starch, which two regions, labelled **i** to **v**, would be involved in forming glycosidic bonds?



A ii and v

B ii and iv

C i and iii

D iii and v

E i and iv

35 Which one of the following molecules will contain the greatest number of different elements?

A amino acids

B water

C lipids

D polysaccharide carbohydrates

E monosaccharide carbohydrates

36 Which one of the following is **NOT** correct about human chromosomes?

A They can attach to the spindle at the centriole.

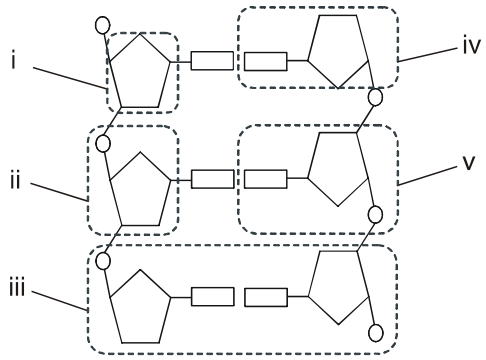
B They are made of DNA and protein.

C They are sometimes found in pairs.

D They contain regions called genes.

E They are sometimes not found in pairs.

37 Which one of the following labels, **i** to **v**, represents a nucleotide?



A v

B ii

C iii

D i

E iv

38 Which one of the following would be different in a pair of non-identical twins?

A alleles

B the total of adenine plus guanine

C amount of nuclear DNA

D genes

E chromosome number

39 In a set of genetic crosses the offspring produced showed the same phenotype ratio of 9:3:3:1.

Which of the following statements could be true?

1. two genes each with two alleles were studied
2. all parents were heterozygous
3. some offspring had a phenotype different to the parents
4. some offspring had a phenotype the same as the parents

A 1, 2, 3 and 4

B 3 and 4 only

C 1 and 2 only

D 1 only

E 2 and 3 only

40 Which of the following crosses is most likely to produce offspring of genotype GgNn?

A GGNN x ggnn

B GGNn x GgNn

C GgNn x GgNn

D ggNN x GGNn

E ggNn x GGNN

41 Which row of the table correctly identifies a blood vessel that has a low concentration of carbon dioxide and a vessel that has a low concentration of urea?

	low carbon dioxide	**low urea**
Row 1	renal vein	pulmonary artery
Row 2	pulmonary vein	renal vein
Row 3	renal artery	pulmonary vein
Row 4	pulmonary vein	renal artery
Row 5	pulmonary artery	renal vein

A Row 2

B Row 1

C Row 3

D Row 4

E Row 5

42 Which of the examples of homeostasis do **NOT** require the brain to be involved in the control process?

1. temperature regulation
2. osmoregulation (regulation of the water content of blood)
3. blood glucose concentration regulation

A 3 only

B 1 only

C 2 only

D 1 and 2 only

E 2 and 3 only

43 Which one of the following is **NOT** true of human hormones?

A They are all released from glands and flow down ducts into the bloodstream.

B They are all chemicals.

C Some, such as testosterone and oestrogen, can be steroids.

D They travel at the speed of blood flow.

E A hormone may affect one or more structures in the body.

44 Antibiotics are becoming less effective due to:

A people not finishing the full course

B people becoming immune to them

C people becoming resistant to them

D artificial selection

E new antibiotics being available

Chemistry

45 Which one of the following could **NOT** be the formula of an aldehyde?

A $C_5H_{12}O$

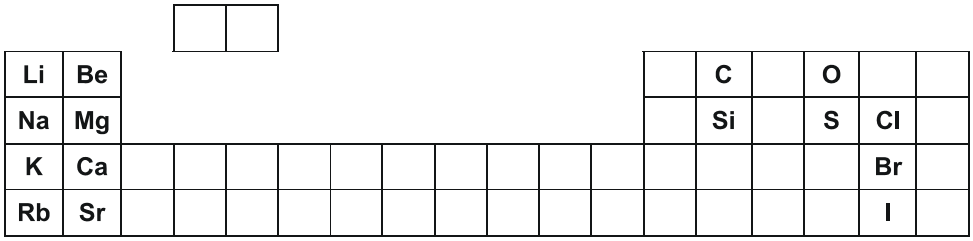
B $C_6H_{12}O$

C $C_6H_{12}O_2$

D $C_5H_{10}O$

E $C_5H_{10}O_2$

46 The positions of some elements in the Periodic Table are shown below.



Which one of the following pairs of elements is most likely to form a covalent bond?

A beryllium and iodine

B potassium and chlorine

C magnesium and bromine

D strontium and oxygen

E calcium and chlorine

47 Which one of the following is **NOT** the correct formula for a lithium compound?

A $LiCO_3$

B $LiHSO_4$

C CH_3CO_2Li

D Li_3N

E Li_2S

48 The Avogadro constant is 6.0×10^{23} mol^{-1}.

How many hydrogen atoms are there in 0.420 g of cyclohexane?

[A_r: H = 1; C = 12]

A 3.6×10^{22}

B 3.0×10^{21}

C 1.8×10^{23}

D 3.0×10^{22}

E 1.8×10^{22}

49 In the following reactions, which substances are acting as oxidising agents?

$C(s) + O_2(g) \rightarrow CO_2(g)$

$2Fe^{3+}(aq) + 2I^-(aq) \rightarrow Fe^{2+}(aq) + I_2(aq)$

$Mg(s) + 2H^+(aq) \rightarrow Mg^{2+}(aq) + H_2(g)$

A $O_2(g)$, $Fe^{3+}(aq)$, $H^+(aq)$

B $C(s)$, $Fe^{3+}(aq)$, $H^+(aq)$

C $O_2(g)$, $I^-(aq)$, $Mg(s)$

D $O_2(g)$, $I^-(aq)$, $H^+(aq)$

E $C(s)$, $Fe^{3+}(aq)$, $Mg(s)$

50 Which of the following statements are correct about the solvent properties of water?

1. All ionic substances dissolve in water.
2. All covalent substances are insoluble in water.
3. The solubility of solids usually increases with a rise in temperature.

A 3 only

B 1 only

C 2 only

D 2 and 3 only

E none

51 Which rows of the table correctly describe the reactions of the aqueous acids with amines and amides?

		Amines	**Amides**
Row 1	**Ethanoic acid**	reacts	does not react
Row 2	**Nitrous acid**	reacts	reacts
Row 3	**Sulphuric acid**	does not react	hydrolyses

A Rows 1 and 2

B None of the rows

C Rows 1 and 3

D Rows 2 and 3

E All of the rows

52 Consider the following reactions.

$C_2H_5Br + OH^- \rightarrow C_2H_5OH + Br^-$

$Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$

$Mg(s) + Cu^{2+}(aq) \rightarrow Mg^{2+}(aq) + Cu(s)$

Which one of the following types of reaction is **NOT** included in this list?

A elimination

B substitution

C displacement

D precipitation

E oxidation/reduction

Physics and Mathematics

53 In a group of students, exactly $\frac{2}{5}$ are male and exactly $\frac{1}{3}$ study mathematics. The probability that a male student chosen at random from the group studies mathematics is p.

Which of the following is the range of possible values of p?

A $0 \le p \le \frac{5}{6}$

B $0 \le p \le \frac{1}{3}$

C $\frac{1}{3} \le p \le \frac{2}{5}$

D $\frac{1}{3} \le p \le 1$

E $\frac{2}{5} \le p \le \frac{5}{6}$

54 The line L has equation $y = 2x - 1$.

Four of the following five points are the same distance from the line L. Which one is at a different distance?

A (5, 13)

B (1, -1)

C (1, 3)

D (4, 9)

E (6, 9)

55 Which of the following is equivalent to $\ln(x^2y) - 2\ln(xy) + 3\ln y$?

A $2\ln y$

B $\ln x + 2\ln y$

C 0

D $\ln x + \ln y$

E $2\ln x + 2\ln y$

56 What is the set of values of x for which $x^2 < 9$ and $2x + 3 \geq 5$?

A $1 \leq x < 3$

B $x > 3$

C $x > -3$

D $x < -3$ or $x \geq 1$

E $x \geq -1$

57 A block of iron at 100 °C is transferred to a plastic cup containing water at 20 °C.

Which one of the following is **NOT** necessary in order to find the specific heat capacity of iron?

A The thermal conductivity of the iron.

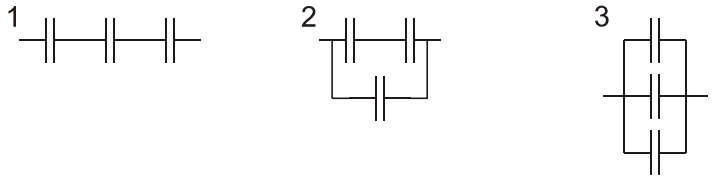
B The mass of water.

C The final temperature.

D The mass of the block of iron.

E The specific heat capacity of water.

58 Three identical capacitors are connected as follows:



Which of the following shows the order of increasing capacitance (smallest first)?

A 1, 2, 3

B 1, 3, 2

C 2, 1, 3

D 2, 3, 1

E 3, 2, 1

59 Which one of the following is **NOT** a vector?

A electric charge

B velocity

C weight

D acceleration

E electric field

60 A man of mass 75 kg lies on a bed of 10 000 nails. The tip of each nail has an area of 1.0 square millimetre.

What pressure does the man experience?

[g = 10 N/kg]

A 7.5×10^4 Pa

B 7.5×10^3 Pa

C 7.5×10^7 Pa

D 7.5×10^6 Pa

E 7.5×10^5 Pa