Ministero dell'Istruzione, dell'Università e della Ricerca

CAMBRIDGE ASSESSMENT

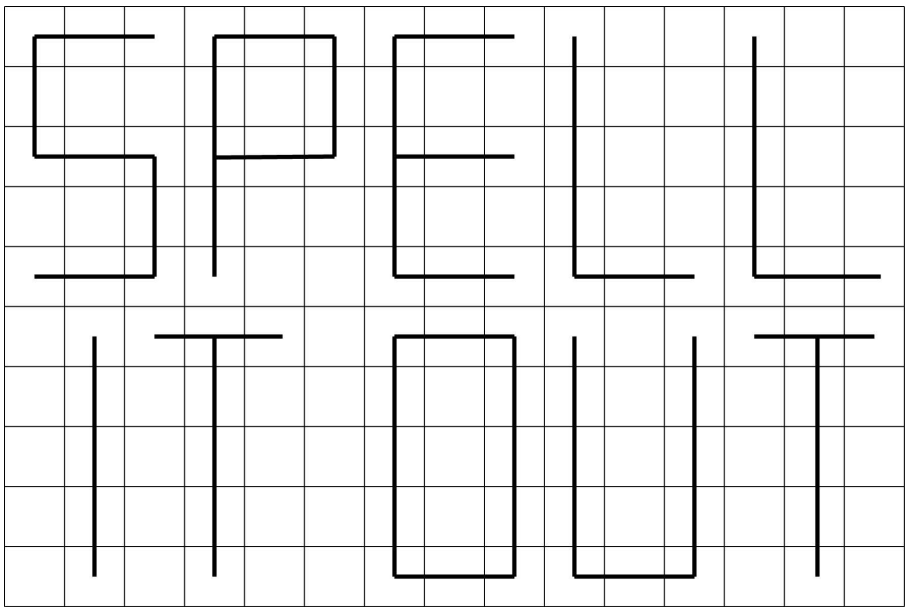
15ML62287

ADMISSION TEST FOR THE DEGREE COURSE IN MEDICINE AND SURGERY

Academic Year 2016/2017

© UCLES 2016

1 This is part of the tiled floor of the magic shop Spell It Out.



Five different types of tile make up the design. How many of the tiles have the pattern ?

A 18

B 19

C 17

D 21

E 20

© UCLES 2016

2 A factory has received an order for a product. It takes 9 operations to manufacture it. These may take place in any order and at any time in the manufacturing process but an individual worker stays with one operation from its beginning to its end. The number of hours for one worker to complete each operation is as follows:

Operation	A	B	C	D	E	F	G	H	I
Duration in hours	12	3	8	9	10	2	6	4	10

All workers are able to complete all operations, but can only do one at a time. The product has to be ready in 16 hours.

What is the minimum number of workers required to manufacture the product in the given time?

A 6

B 4

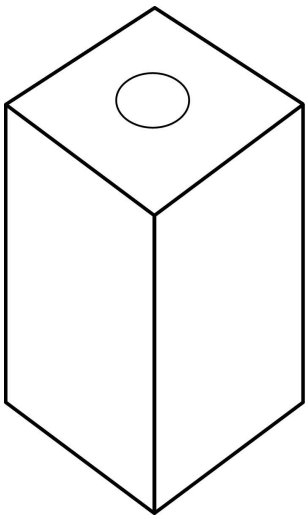
C 9

D 1

E 5

© UCLES 2016

3 Below is a picture of a biscuit tin with four identical sides. A set of these tins is to be made that are all distinguishable from each other by colour alone. The manufacturer will paint each of the four sides either red or blue. The top and bottom are not painted.



What is the greatest number of different tins that can be made?

A 6

B 7

C 8

D 4

E 5

© UCLES 2016

4 In a slalom skiing competition skiers tackle the course one at a time. Each skier makes two runs. The times for the two runs are added and the fastest total time determines the winner. Competitors who fail to finish their first run are not allowed to make a second run.

In the second round, skiers compete in the reverse order of their positions after the first round.

Grace took part in a slalom competition last week. She was the eighth skier to make her first run. At the end of the first round she was in sixth position, so she had to wait for 17 of her rivals to make their second runs before it was her turn again. Three skiers had failed to complete the course in the first round.

How many competitors took part in last week's slalom competition?

A 26

B 23

C 34

D 31

E 28

5 In 1688 the Irish philosopher William Molyneux asked whether a blind person who regained their vision could recognise by sight an object they had previously only known by touch. Richard Held and Pawan Sinha of the Massachusetts Institute of Technology attempted to answer this question in an experiment with five children in India who had just had successful surgery which gave them their sight for the first time. Within 48 hours of the operation the children were asked to feel a toy block without looking at it. They were then shown two blocks, one of which they had touched. They identified the orginal block just over half of the time and this is only a little better than guesswork. Recognising touched objects by sight alone improved within days.

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

A Using children in experiments such as the one described above is morally wrong.

B Identifying an object by sight alone which had been touched but not seen previously is learned behaviour and not innate.

C Identifying an object by sight alone which had been touched but not seen previously is innate behaviour and not learned.

D Identifying an object by sight alone which had been touched but not seen previously is something which adults do better than children.

E Identifying an object by sight alone which had been touched but not seen previously is something which children do better than adults.

© UCLES 2016

6 A delivery company opens its depot at 7:30 am. It uses large and small vans to make deliveries. The smaller vans take 10 minutes to load and then 1 hour to make the deliveries and return. The larger ones have a loading time of 30 minutes and return from deliveries after 2 hours. The driver of a large van starts loading at 8:00 am.

If the driver of a small van is to make the maximum number of deliveries he can, how much later than the driver of the large van can he start loading if they are both to arrive back at the depot for lunch at 1:00 pm?

A 0 minutes

B 20 minutes

C 15 minutes

D 5 minutes

E 10 minutes

© UCLES 2016

7 A bakery shop makes its own bread in batches to sell on site. Bakers always describe the quantities of other ingredients as a percentage of the weight of flour used. They will then use the percentages in the table below to calculate how much water, salt and fat are required. Today, the baker is planning to use 250 kg of flour to make White Bread.

The Baker's Percentage			
Bread Type	*Water (%)*	*Salt (%)*	*Fat (%)*
Neapolitan Pizza	59	1.5	None
Baguette	60	2	None
French Bread	66	2	None
Ciabatta	80	2	2.5
Focaccia	80	3	3
White Bread	54	2	17
Brioche	22	2	133

What is the total weight of the mixture to be made?

A 323 kg

B 432.5 kg

C 250 kg

D 182.5 kg

E 420 kg

© UCLES 2016

8 My choice of sandwich will depend on its nutritional content as shown in the following table:

type	*price (£)*	*energy (kJ)*	*protein (g)*	*fat (g)*	*salt equiv (g)*
beef	2.00	1220	22	3.4	1.3
chicken	2.10	1327	26	4.1	1.4
ham	1.90	1164	18	3.8	1.7
turkey	2.20	1163	20	2.5	1.5
salad	1.50	931	8	3.3	1.7
tuna	2.00	1579	19	14.3	1.7

I want to have at least 20 g of protein in my sandwich and no more than 4 g of fat.

Which is the smallest amount that I will pay for my sandwich?

A £2.20

B £2.00

C £1.50

D £2.10

E £1.90

© UCLES 2016

9 Few linguists would argue against the view that our first language is acquired and not learned. Pre-school children do not study their native tongue nor do they learn grammar rules but, by the time they start school at the age of five or six, the vast majority are competent users of their language. Therefore, when learning a second or additional language, studying grammar is a waste of time and all that is required is exposure to the target language in order to acquire competency in its use.

Which one of the following identifies the underlying assumption of the above argument?

A Only people who know how to read can learn a second or additional language.

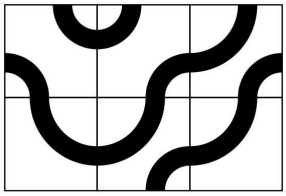
B Languages are fundamentally different from one another.

C Children are better at acquiring languages than adults.

D Learners of second or additional languages should read the target language.

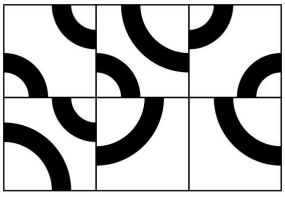
E Acquiring a second or additional language is the same process as acquiring a first language.

10 The following pattern is made from six square tiles:

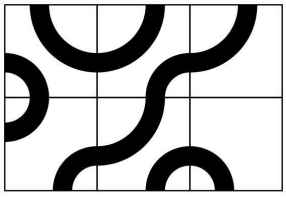


Which one of the following patterns can also be made from the same six tiles?

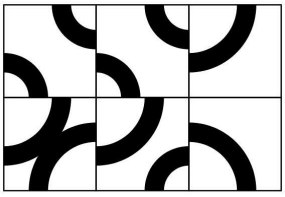
A



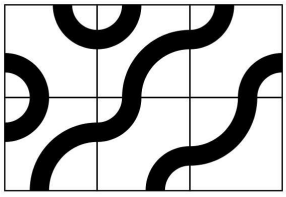
B



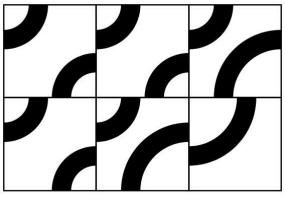
C



D



E



© UCLES 2016

11 Children need to play in order to develop their thinking skills. When children play, they are merely going through scenarios, working out the consequences and implications of actions, puzzling out what might happen – the very same processes that adults have learned to do in their heads, the process more commonly known as 'thinking'! It follows that thinking and playing are really one and the same thing.

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

A Children need to be taught how to think about the future.

B Children who do not play will not be good thinkers.

C Playing and thinking are essentially two forms of the same activity.

D Children need to be allowed to play in order to develop their thinking skills.

E Playing is just an early version of abstract thinking and reasoning.

12 What is a clone but a twin? What is genetic engineering or selective breeding but assisted evolution? How often do we hear these trite excuses for man's arrogant interference with natural processes? Too often. It is time to call a halt and consider just what limits need to be placed on the break-neck progress of bio-technology, if 'progress' is even the right word for it. The big question for science should not be 'What's in it for us?' but 'Could this have happened naturally?' And if the answer is 'No' then we should not bring it about just because we have found that we can. If we do we may live a bit longer or grow more food per acre, but we don't know where our meddling will end.

Which one of the following is a principle which underlies the above argument?

A Nature will have its own way in the long run.

B Meddling with nature could only ever end in disaster.

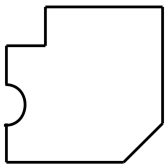
C Science should not progress beyond what is natural.

D It is time to call a halt on bio-technological advances.

E Cloning, genetic engineering and selective breeding are not 'progress'.

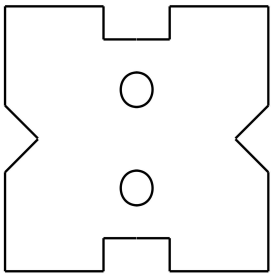
© UCLES 2016

13 I have folded a square piece of paper in half, then in half again, then cut three pieces from the resulting smaller square, as indicated below:

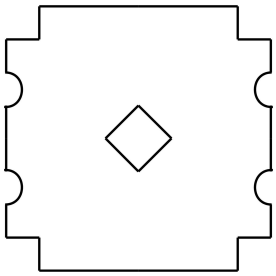


Which one of the following CANNOT possibly be the appearance of the paper after I unfold it?

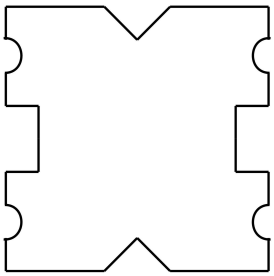
A



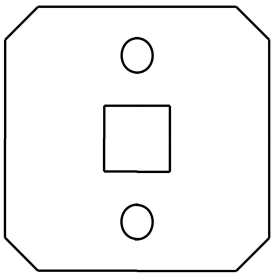
B



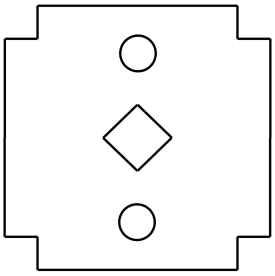
C



D



E



© UCLES 2016

14 Children born in Japan today can expect to live five years longer than their American counterparts. Life expectancy has been rising in all countries, but the slowest rate of increase has been in the USA. What could account for this, given that the percentage of people who smoke is roughly the same in all rich countries? Of course, the USA is the birthplace of fast food restaurants that sell unhealthy food. Moreover, a recent survey of American lifestyles has found that overeating and failure to exercise are widespread amongst the population. So we must assume that obesity and lack of exercise have caused the USA to lag behind in the increase in life expectancy.

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

A Most rich countries have the same standard of medical expertise.

B The USA spends more money on fast food than any other nation.

C Japanese children had a healthier diet in the 1960s than they do today.

D In the 1960s and 1970s the USA had the highest percentage of smokers.

E American fast food restaurants are now found in most rich countries.

15 While some animal rights activists have long accepted that there is a link between bovine tuberculosis (TB in cattle) and badgers, others have argued that it was not proven. They felt that the culling of badgers to stop the spread of TB in cattle was not justified if a link was unproven. But direct evidence of the transmission of TB between badgers and cattle has now been found. DNA sequencing of the TB bacteria in cattle and in badgers has shown that the disease crosses species barriers. This latest discovery completely undermines the case of those who have opposed badger culling. To protect farmers from severe loss of their cattle and hence their livelihoods – and to protect one of our primary sources of meat and milk – the badger population should be culled.

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

A Animal rights activists are interested in the protection of badgers per se, whatever risk they pose.

B There may be factors other than badgers, such as the movement of cattle, which contribute to the spread of TB in cattle.

C It is too expensive and logistically difficult to vaccinate all cattle against TB.

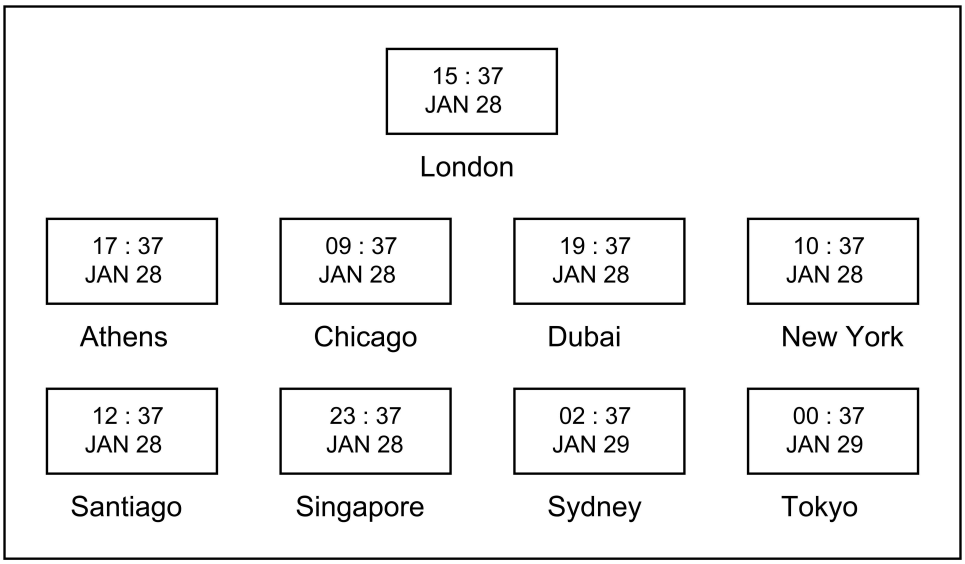
D Badger culling would be unpopular with a substantial number of people.

E Not all farmers are convinced that the culling of badgers would stop the spread of TB.

© UCLES 2016

16 In the foyer of a company in London there are nine clocks showing the local time at each of the company's nine branches.

This is how they appear at present:



The person in charge of re-setting these clocks in March and October has to remember:

1 In Dubai, Singapore and Tokyo clocks remain unchanged all year round.

2 In London, Athens, Chicago and New York clocks are put one hour forward in March and one hour back in October.

3 In Santiago and Sydney clocks are put one hour forward in October and one hour back in March.

When these clocks are next reset, which two will show the same time?

A Chicago and New York

B Athens and London

C New York and Santiago

D Singapore and Tokyo

E Sydney and Tokyo

© UCLES 2016

17 Childhood obesity is still a problem. This is often blamed on the fact that children have easy access to a range of unhealthy foods and increasingly have more money available to them to spend on fattening and sugar-filled foods. A solution seems obvious – raise the prices of all these foods so that parents will have more control over what their children eat and will find it more economical to buy healthy foods. Unfortunately, this is unlikely to work as the problem is also caused by the fact that unhealthy foods tend to be more convenient and that is what many parents consider when deciding what foods to provide. A wider range of 'ready to eat' healthy food options would be a good start to solving the problem of child obesity.

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

A Parents should have more control over the food that their children eat.

B The price of unhealthy foods should be raised.

C There should be more 'ready to eat' healthy meals available.

D Children have too much access to fattening and sugar-filled foods.

E Child obesity is still a problem.

18 The government is considering changing the law to assume consent for the donation of organs after death. People opposed to the idea would have to deliberately 'opt out' of the scheme, although relatives would still be consulted. The supply of healthy organs available for transplant would be vastly increased under this scheme. If the government really wants to improve the lives of people with long-term health problems, this is a measure it must take.

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

A Bereaved relatives find donation decisions very distressing.

B The number of voluntary organ donors is small and not increasing.

C Not all of the organs donated are suitable for transplant.

D There would be opposition by civil liberties groups to this measure.

E It is not known how many people would 'opt out' of the compulsory scheme.

© UCLES 2016

19 In recent years there has been increased concern that fashion models reflect an unrealistic and unattainable image of femininity and that this has a negative effect on the self-esteem of many young women. Many major designers continue to design for an exceptionally tall and flat-chested female frame. It should be no surprise therefore that there have been several cases recently when designers have favoured male models on their catwalks to model their womenswear. Rather than being a cause of surprise or concern, this should be welcomed as a recognition of the fact that these designs are unsuitable for most women and it draws attention to the major differences between catwalk fashion and clothing for the real world.

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

A Some designers have favoured male models simply to generate more media attention for their collections.

B Some female models struggle to maintain the necessary physique for catwalk modelling.

C Some designers are recognising that the physique of many catwalk models represents an unhealthy ideal for most women.

D Very few observers noticed initially that the male models were not in fact women.

E Surveys of young women have suggested that the use of male models makes the typical model physique less desirable to attain.

20 High profile members of society can raise awareness of worthy causes better than members of the public, because they have their opinions listened to and respected more readily by a larger number of people. Celebrities should not be shy about drawing attention to charities and foundations to which they donate their time and money, because it may encourage other people to do the same.

Which one of the following best illustrates the principle underlying the argument above?

A People should value their superiors' opinions on all matters because they have been successful in one or more fields.

B If your boss does not commit any virtuous acts then neither should you.

C If you can help someone else by donating your disposable time and money, it will help improve society.

D Directors of companies should encourage their employees to recycle more by visibly doing so themselves.

E Companies with the most employees should be put under pressure to commit to the most social change.

© UCLES 2016

21 Which of the following countries is NOT a founding member of NATO?

A Canada

B Belgium

C Germany

D France

E Italy

22 Which of the following is NOT one of the Seven Wonders of the Ancient World?

A The Hanging Gardens of Babylon

B The Great Pyramid of Giza

C The Lighthouse of Alexandria

D The Parthenon of Athens

E The Colossus of Rhodes

© UCLES 2016

23 Which organelle contains RNA but not DNA?

A nucleolus

B mitochondrion

C chloroplast

D smooth endoplasmic reticulum

E ribosome

24 An organism is heterozygous for two genes. These two genes make up part of the same DNA molecule.

For one gene, E represents the dominant allele, e represents the recessive allele.

For the other gene, R represents the dominant allele, r represents the recessive allele.

Assuming there is no mutation, at the end of a mitotic division producing two cells which row(s) is/are possible?

	number of DNA molecules containing these two genes in each cell	*alleles present in each cell*
row 1	one	only E or only R
row 2	one	E and r
row 3	one	E and R
row 4	two	only E on one molecule, only R on the other
row 5	two	only e on one molecule, only r on the other
row 6	two	E and R on one molecule, e and r on the other
row 7	two	E and r on one molecule, e and R on the other

A row 6 only

B rows 4 and 5 only

C row 1 only

D rows 2 and 3 only

E rows 6 and 7 only

© UCLES 2016

25 Which row correctly identifies a nucleic acid NOT directly involved in transcription, and a nucleic acid which is NOT directly involved in translation?

row	*nucleic acid NOT directly involved in transcription*	*nucleic acid NOT directly involved in translation*
1	tRNA	DNA
2	mRNA	tRNA
3	DNA	mRNA
4	tRNA	mRNA
5	DNA	DNA

A row 3

B row 5

C row 1

D row 4

E row 2

26 Which row of the table correctly indicates features that are found in **both** pure extracts of DNA and tRNA molecules?

✓ = present and X = absent

	pentose sugar	*adenine*	*hydrogen bond*	*phosphodiester bond*	*uracil*
row 1	✓	✓	X	X	X
row 2	X	✓	✓	✓	✓
row 3	✓	X	X	✓	✓
row 4	✓	✓	✓	✓	X
row 5	X	✓	X	X	✓

A row 4

B row 1

C row 5

D row 3

E row 2

© UCLES 2016

27 Which of the following can be random processes?

1 genetic drift

2 mutations

3 artificial selection

A 2 and 3 only

B 1, 2 and 3

C 1 and 2 only

D none of them

E 1 and 3 only

28 Below are some steps involved in the production of transgenic plants.

Step V: Mixing of the required gene and the plasmid with ligases

Step W: Isolation of the required gene using restriction enzymes

Step X: Identification of the recombinant plasmid

Step Y: Injection of plasmid into host plant cell

Step Z: Use of restriction enzymes to produce sticky ends in the plasmid

Which one of the following options gives a correct order for these steps?

A W → Z → X → V → Y

B W → Z → X → Y → V

C Z → W → V → Y → X

D W → V → Z → X → Y

E Z → W → V → X → Y

© UCLES 2016

29 Which sequence shows cells of increasing size (from left to right)?

A E. coli → human red blood cell → onion epidermal cell

B human red blood cell → E.coli → onion epidermal cell

C E. coli → onion epidermal cell → human red blood cell

D onion epidermal cell → human red blood cell → E. coli

E onion epidermal cell → E. coli → human red blood cell

30 Which option shows the structure in humans that produces bile and then the structure that stores bile?

A gall bladder produces and then liver stores

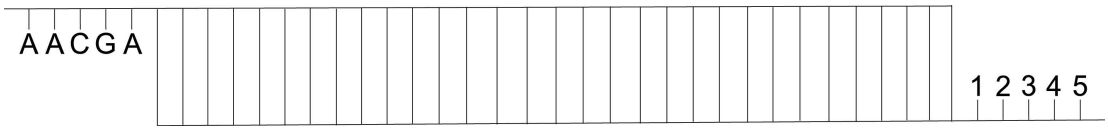
B liver produces and then liver stores

C gall bladder produces and then gall bladder stores

D liver produces and then gall bladder stores

E liver produces and then duodenum stores

31 The diagram represents a whole DNA plasmid that has been cut open using a single restriction enzyme:



What are the bases in positions 1, 2, 3, 4 and 5 respectively?

A T T G C T

B U C G U U

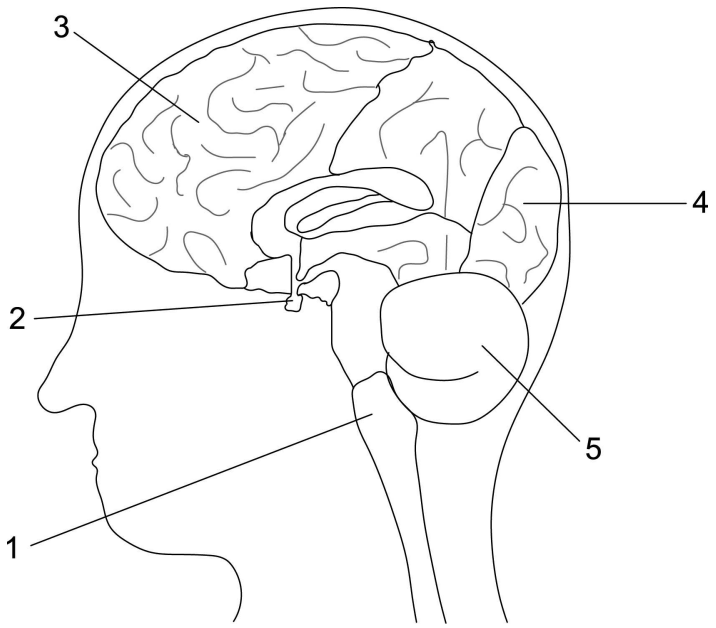
C U G C U U

D U U G C T

E T C G T T

© UCLES 2016

32 Which labelled structure on the diagram of the brain plays the major role in regulating the nervous control of heart rate?



A 1

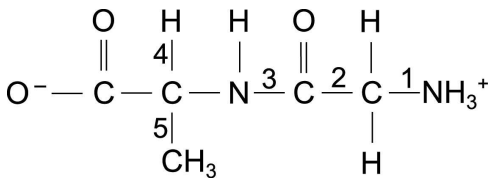
B 3

C 4

D 2

E 5

33 The dipeptide represented below is in aqueous solution.



Which numbered bond (1 to 5) needs to be broken (hydrolysed) in this dipeptide to directly form two amino acids?

A 1

B 5

C 3

D 4

E 2

© UCLES 2016

34 Which of the following are respiratory enzymes?

1 acetyl coenzyme A

2 FAD

3 reduced NAD

A 1 and 2 only

B 2 and 3 only

C 1, 2 and 3

D none of them

E 1 and 3 only

35 In the testes of a healthy man there are diploid cells that undergo meiosis to produce gametes.

Which of the following statements is/are correct about meiosis for one of these diploid cells?

1 The diploid cell has doubled its DNA content before the start of meiosis I.

2 The cells at the start of meiosis II are diploid.

3 The total number of chromosomes produced by the end of meiosis II is double that of the original diploid cell.

A 3 only

B 2 and 3 only

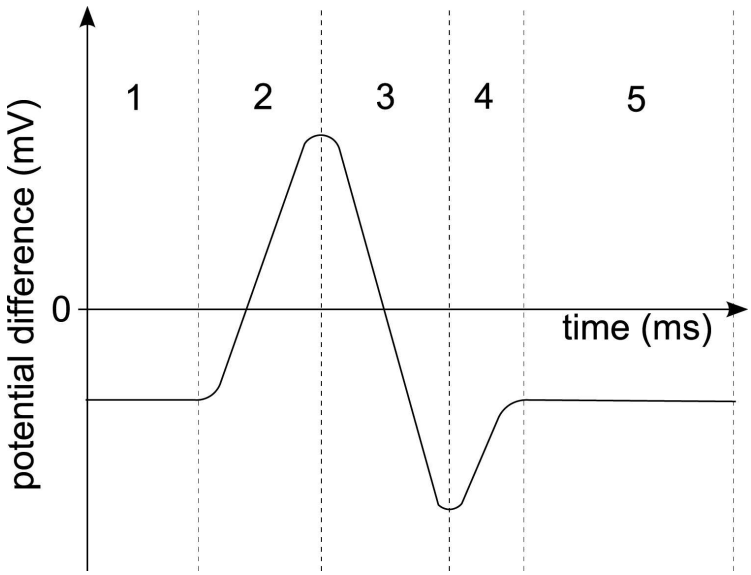
C 1, 2 and 3

D 1 and 3 only

E 1 only

© UCLES 2016

36 The diagram shows the change in potential difference (pd) across the cell surface membrane of a sensory neurone. During which one of the phases (1–5) are the Na^+ gates of the neurone open?



A 1

B 3

C 4

D 2

E 5

37 An experiment is set up to study two genes. The two genes assort independently and for each gene the expression of alleles involves complete dominance. In the genetic cross RrTt x RrTt, a number of different phenotypes are seen. What is the difference between this number of phenotypes and the number of phenotypes seen when the cross RrTt x rrtt is carried out?

A 4

B 8

C 2

D 1

E 0

© UCLES 2016

38 Which option correctly identifies the site of the light-dependent reactions in photosynthesis (S), the hydrogen carrier (H) used and its end state (N)?

A S: stroma; H: NAD; N: reduced

B S: granum; H: NAD; N: reduced

C S: granum; H: NADP; N: reduced

D S: stroma; H: NADP; N: oxidised

E S: stroma; H: FAD; N: oxidised

39 The following shows the phases in mitosis.

Prophase → Phase two → Anaphase → Phase four

Which row in the table below shows the correct processes occurring in Phase two and Phase four of mitosis?

	Phase two	*Phase four*
row 1	chromosomes line up	nuclear envelope reforms
row 2	spindle fibres contract	chromosomes reach opposite poles
row 3	DNA duplicates to form sister chromatids	chromosomes are not visible
row 4	DNA starts to condense	chromatids separate and move to opposite poles
row 5	homologous chromosomes line up	cytoplasm of parent cell is divided into two daughter cells

A row 1 and row 5 only

B row 1 only

C row 2 and row 3 only

D row 5 only

E row 4 only

© UCLES 2016

40 In which of the following organelles do carbohydrates play a relevant role?

1 mitochondria

2 Golgi apparatus

3 chloroplasts

A 1 and 3 only

B 2 only

C 1 and 2 only

D 2 and 3 only

E 1, 2 and 3

© UCLES 2016

41 Which of the following substances will form an alkaline solution when dissolved in water?

1 Na_2CO_3

2 NaCl

3 $NaHSO_4$

A 1, 2 and 3

B 1 only

C 1 and 2 only

D 2 and 3 only

E 1 and 3 only

42 Lead(II) nitrate solution and potassium iodide solution react to form potassium nitrate in solution and a bright yellow precipitate of lead(II) iodide.

Which one of the following correctly represents the ionic equation for this chemical reaction?

A $Pb^{2+}(aq) + I^{-}(aq) \rightarrow PbI(s)$

B $Pb^{2+}(aq) + I^{2-}(aq) \rightarrow PbI(s)$

C $Pb^{+}(aq) + 2I^{-}(aq) \rightarrow PbI_2(s)$

D $Pb^{2+}(aq) + 2I^{-}(aq) \rightarrow PbI_2(s)$

E $Pb^{+}(aq) + I^{-}(aq) \rightarrow PbI(s)$

© UCLES 2016

43 The formula of a molecule is $CH_2CHCH_2CH_2COCH_2CHO$.

Which functional groups given below are present in the molecule?

1 alkene

2 alcohol

3 aldehyde

4 ketone

A 1, 3 and 4 only

B 2, 3 and 4 only

C 1 and 4 only

D 1, 2 and 3 only

E 3 and 4 only

44 Which of these particles have the same electronic structure?

1 $_{12}Mg^{2+}$

2 $_{10}Ne$

3 $_{16}S^{2-}$

4 $_{9}F^{-}$

5 $_{3}Li^{+}$

A 1, 2 and 5 only

B 2, 4 and 5 only

C 1, 2 and 3 only

D 3, 4 and 5 only

E 1, 2 and 4 only

© UCLES 2016

45 A mixture of methanol and ethanoic acid is left until equilibrium is reached. The equation for this reaction is given below.

$$CH_3OH(l) + CH_3COOH(l) \rightleftharpoons CH_3COOCH_3(l) + H_2O(l) \qquad \Delta H = -8.5\ kJmol^{-1}$$

The amount of CH_3OH in this mixture at equilibrium can be increased by:

1 adding more water to the mixture

2 raising the temperature of the mixture

3 adding sodium hydroxide to the mixture

4 adding a catalyst to the mixture

A 2 and 4 only

B 1 and 2 only

C 1 and 3 only

D 1, 2 and 3 only

E 4 only

46 The compounds carbon dioxide (CO_2), propane (C_3H_8) and ethanal (CH_3CHO) all have M_r = 44.

Which of the following lists correctly shows these compounds in the order that they become gases as their temperature rises from –100°C at the same pressure?

A CO_2, C_3H_8, CH_3CHO

B CH_3CHO, C_3H_8, CO_2

C CO_2, CH_3CHO, C_3H_8

D C_3H_8, CO_2, CH_3CHO

E C_3H_8, CH_3CHO, CO_2

© UCLES 2016

47 A sample of lithium was completely reacted with water. The equation for this reaction is:

$2Li(s) + 2H_2O(l) \rightarrow 2LiOH(aq) + H_2(g)$

The aqueous lithium hydroxide solution formed has a concentration of 0.10 mol/L.

What is its concentration in g/L?

(A_r: Li = 7.0; O = 16.0; H = 1.0)

A 240

B 480

C 4.8

D 3.1

E 2.4

48 An aqueous solution of NaOH has a concentration of 0.01 mol/L.

Given the ionic product of water is $K_w = [H^+]\,[OH^-] = 10^{-14}\ mol^2/L^2$ (at 25°C) and that the equation for pH is $pH = -\log_{10}[H^+]$, calculate the pH of the NaOH solution at 25°C.

A 13

B 11

C 7

D 14

E 12

49 How many unbranched straight chain molecules are there with the molecular formula $C_4H_8F_2$, but with different structural formulas?

A 8

B 4

C 9

D 12

E 6

© UCLES 2016

50 Identify the number of protons (p), neutrons (n) and electrons (e) present in the ion:

$$^{52}_{24}Cr^{3+}$$

A p = 27 n = 25 e = 21

B p = 24 n = 28 e = 24

C p = 27 n = 25 e = 24

D p = 24 n = 28 e = 21

E p = 24 n = 24 e = 21

51 Which of the following molecules contain bond angles of 180° in their gaseous states?

(Atomic numbers: H = 1; Be = 4; C = 6; Cl = 17)

1 $BeCl_2$

2 C_2H_2

3 CCl_4

A 1 and 3 only

B 1 and 2 only

C 1 only

D 2 and 3 only

E 2 only

© UCLES 2016

52 Five of the ions of vanadium are listed below:

1 VO_3^-

2 V^{3+}

3 V^{2+}

4 VO^{2+}

5 VO_2^+

Which two ions have vanadium in the same oxidation state?

A 2 and 5

B 1 and 5

C 3 and 4

D 4 and 5

E 1 and 3

© UCLES 2016

53 A right-angled triangle has an area of 18 cm². One of the two shorter sides is twice the length of the other one.

What is the length of the hypotenuse of the triangle?

A $9\sqrt{2}$ cm

B $6\sqrt{5}$ cm

C $3\sqrt{10}$ cm

D $3\sqrt{5}$ cm

E $3\sqrt{6}$ cm

54 Which physical quantity can be measured in joules per metre?

A kinetic energy

B momentum

C power

D work

E force

© UCLES 2016

55 Which one of the following is a simplification of

$$\frac{2}{x^2-1}-\frac{1}{x-1}$$

[where $x \neq \pm 1$]

A $-\frac{1}{x+1}$

B $\frac{2}{x-1}$

C $\frac{3-x}{(x-1)^2}$

D $\frac{1}{x^2-1}$

E $\frac{3-x}{(x-1)(x+1)}$

56 The straight-line graph given by the equation

$$\frac{x}{4}+\frac{y}{6}=1$$

intersects the x-axis at A (a,0) and the y-axis at B (0,b).

A circle passes through A and B and has a diameter AB.

What are the coordinates of the centre of the circle?

A (2, 3)

B (3, 2)

C (6, 4)

D (4, 6)

E (0, 0)

© UCLES 2016

57 A student has three 6.0 Ω resistors that can be connected together in any configuration. What are the maximum and minimum resistances that can be obtained by using one or more of these three resistors?

[Assume the connections between the resistors have negligible resistance, the temperature of the resistors is constant, the resistors are used in a d.c. circuit and none of the resistors is short-circuited.]

A maximum resistance: 6.0 Ω; minimum resistance: 2.0 Ω

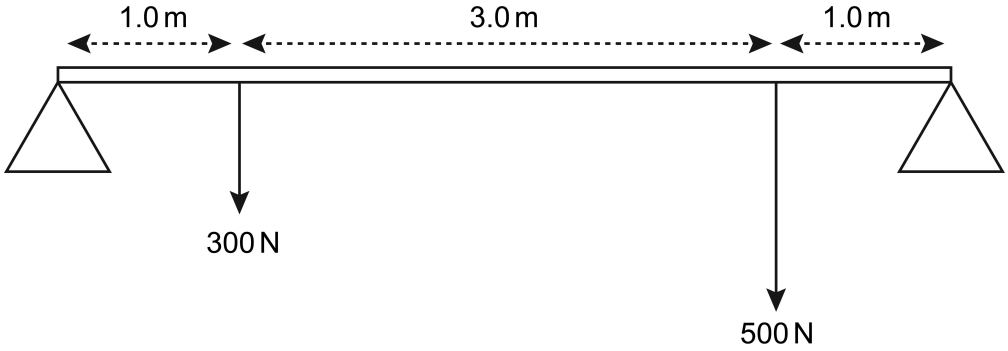
B maximum resistance: 12 Ω; minimum resistance: 0.50 Ω

C maximum resistance: 6.0 Ω; minimum resistance: 0.50 Ω

D maximum resistance: 18 Ω; minimum resistance: 6.0 Ω

E maximum resistance: 18.0 Ω; minimum resistance: 2.0 Ω

58 The diagram shows a uniform horizontal beam of negligible mass, 5.0 m long, placed on two supports, one at each end. It has a 300 N weight placed 1.0 m from one end and a 500 N weight placed 1.0 m from the other end. Both weights act vertically on the beam as shown in the diagram.



What are the upward forces from the two supports acting on the beam?

A 340 N and 460 N

B 300 N and 500 N

C 240 N and 560 N

D 400 N and 400 N

E 360 N and 540 N

© UCLES 2016

59 A ball is projected vertically upwards and then falls back to its original position.

Once projected, the ball experiences only a single force, downwards, due to a constant gravitational field strength of 10 N/kg.

Here are three statements about the ball:

1 When the ball is moving upwards it loses kinetic energy and gains potential energy.

2 The magnitude of the ball's acceleration increases as it falls.

3 No vertical forces act on the ball when it is at its maximum height.

Which of the statement(s) is/are correct?

A 2 and 3 only

B none of them

C 1 and 2 only

D 3 only

E 1 only

60 $x = 3 \times 10^{m}$ and $y = 5 \times 10^{n}$ where m and n are integers.

Which of the following is an expression, in scientific notation, for xy?

A $8 \times 10^{m+n}$

B 1.5×10^{mn}

C $15 \times 10^{m+n-1}$

D $1.5 \times 10^{mn+1}$

E $1.5 \times 10^{m+n+1}$

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016

© UCLES 2016