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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B621/01

GATEWAY SCIENCE

SCIENCE B

Unit 1 Modules B1 C1 P1 (Foundation Tier)

FRIDAY 27 MAY 2011: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**Candidates answer on the question paper.
A calculator may be used for this paper.**

OCR SUPPLIED MATERIALS:

Insert (graph)

OTHER MATERIALS REQUIRED:

Pencil

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**
- **Answer ALL the questions.**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **A list of physics equations is printed on page three.**
- **The Periodic Table is provided.**
- **The total number of marks for this paper is 60.**

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

Answer ALL the questions.

SECTION A – MODULE B1

1 Jo investigates her pulse rate.

She exercises by running across the school playing field.

She then sits down and measures her pulse rate every minute for 10 minutes.

The graph on the loose A3 sheet shows her results.

(a) Use the graph to answer the questions.

(i) What is Jo's lowest pulse rate?

_____ **beats per minute [1]**

(ii) After exercise, Jo's pulse rate returns to its lowest value.

How long after her exercise does it take for Jo's pulse rate to return to its lowest value?

_____ **minutes [1]**

(b) Complete the sentences about what happens when Jo exercises.

When Jo exercises, her pulse rate increases to get more _____ TO her muscles.

Her pulse rate also increases to remove more _____ FROM her muscles. [2]

(c) (i) Jo wants to measure her body temperature before she exercises.

What should she use to measure her temperature?

_____ [1]

(ii) Jo's body temperature BEFORE she exercises is 37°C.

What is Jo's body temperature DURING exercise?

Put a ring around the BEST answer.

31°C 34°C 37°C 40°C 43°C [1]

(iii) When she exercises, Jo starts to sweat.

Why does Jo need to sweat?

_____ [1]

[Total: 7]

2 (a) Sam has red-green colour blindness.

This means that he CANNOT tell the difference between red and green colours.

(i) Red-green colour blindness is an inherited disorder.

Look at the list.

Put a tick (✓) in the box next to another inherited disorder.

- | | |
|------------------------|--------------------------|
| athlete's foot | <input type="checkbox"/> |
| cholera | <input type="checkbox"/> |
| cystic fibrosis | <input type="checkbox"/> |
| dysentery | <input type="checkbox"/> |
| flu | <input type="checkbox"/> |

[1]

(ii) In which part of a cell would you find the gene for red-green colour blindness?

_____ **[1]**

(iii) Red-green colour blindness is the result of CHANGES to genes.

Write down the scientific word for a change to a gene.

_____ **[1]**

(iv) Sam has an IDENTICAL twin called Todd.

Todd has the same genes as Sam.

What is the probability that Todd also has red-green colour blindness?

Put a **ring** around the correct answer.

0%

25%

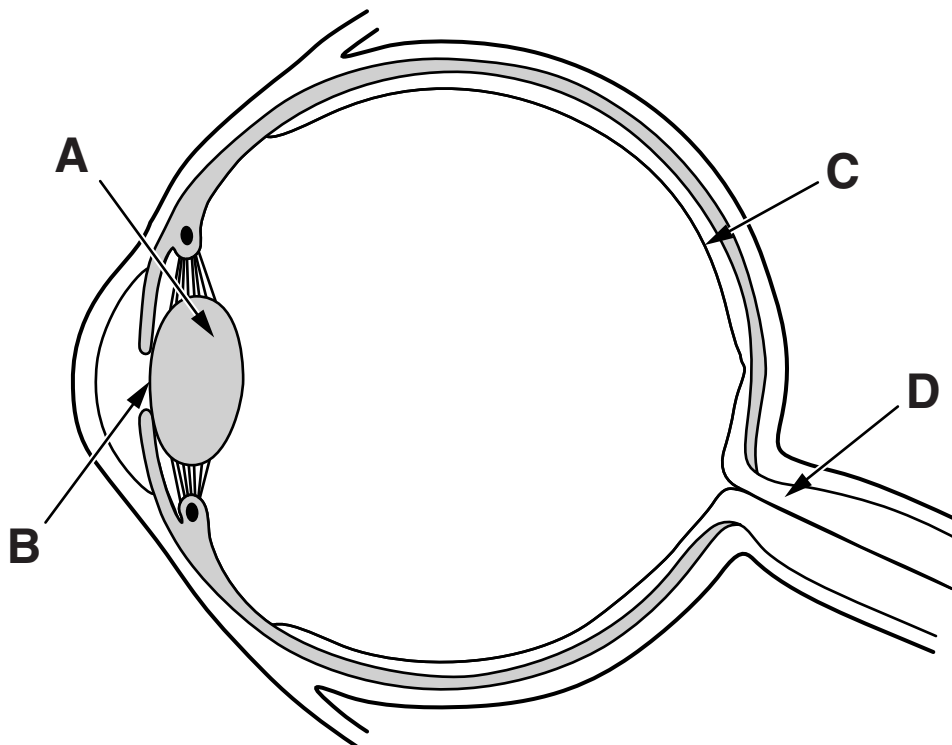
50%

100%

[1]

(v) Red-green colour blindness is caused by a lack of special cells in the retina.

Look at the diagram of an eye.



Which part is the retina?

Choose from A, B, C or D.

answer _____

[1]

(b) Vision can also be affected by drinking alcohol.

(i) Alcohol slows down brain activity.

Write down the name of the TYPE of drug that slows down brain activity.

_____ [1]

(ii) What effect does drinking a lot of alcohol have on vision?

_____ [1]

[Total: 7]

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Question 3 begins on page 10

3 (a) Dalia lives in a part of Africa where there are food shortages.

She has not eaten enough PROTEIN.

She has a swollen stomach.

(i) What is the name of Dalia's condition?

Put a **ring** around the correct answer.

CONSTIPATION

DIABETES

KWASHIORKOR

OBESITY

SCURVY

[1]

(ii) The recommended daily amount of protein (RDA) can be calculated using the formula:

$$\text{RDA in g} = 0.75 \times \text{body mass in kg}$$

Dalia's friend Nia has a body mass of 40 kg.

Calculate Nia's RDA of protein.

answer _____ g

[1]

(iii) Nia's body mass is greater than Dalia's.

Nia eats more meat and fish.

Protein from meat and fish is called FIRST CLASS PROTEIN.

Why is it called first class protein?

_____ [1]

(b) Malaria is a common disease in the part of Africa where Dalia and Nia live.

Describe how malaria is spread.

In your answer include

- what causes malaria**
- how it is spread from one person to another.**

_____ [3]

[Total: 6]

SECTION B – MODULE C1

4 This question is about food.

(a) Apples are eaten raw.

Potatoes are cooked before they are eaten.

One of the reasons potatoes are cooked is to improve their texture.

Write down two **OTHER** reasons why potatoes are cooked before they are eaten.

1 _____

2 _____ [2]

(b) How does the **TEXTURE** of a potato change when it is cooked?

_____ [1]

(c) Jean bakes a cake.

Jean's cake does not rise.

Which ingredient did Jean forget to put in her cake mixture?

Choose from the list.

BAKING POWDER

BUTTER

FLOUR

SUGAR

answer _____ [1]

[Total: 4]

5 Paul collects his shirts from the dry cleaners.

They are wrapped in a plastic bag.

(a) Answer the following questions using words from the list.

NYLON

POLYESTER

POLY(ETHENE)

POLY(PROPENE)

POLYSTYRENE

(i) Write down the name of the polymer most often used to make plastic bags.

_____ [1]

(ii) Write down the names of TWO polymers used to make shirts.

_____ and _____ [1]

(b) Look at the information about polymers A, B, C and D.

POLYMER	MELTING POINT IN °C	EASY TO MOULD?	EASILY COLOURED?	STIFF OR FLEXIBLE?
A	250	no	yes	stiff
B	98	yes	no	flexible
C	240	yes	no	flexible
D	160	yes	yes	stiff

Which polymer would be best for making a washing-up bowl?

Explain your choice.

_____ [1]

(c) Complete the following sentences about making polymers.

Polymers are made when many small molecules called _____ join together.

The reaction that makes polymers is called

_____ .

[2]

[Total: 5]

6 This question is about hydrocarbon fuels.

Look at the table.

It shows information about four gases which can be used as fuels.

GAS	MOLECULAR FORMULA	DISPLAYED FORMULA
methane	CH_4	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$
ethane	C_2H_6	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
propane		$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$
butane	C_4H_{10}	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$

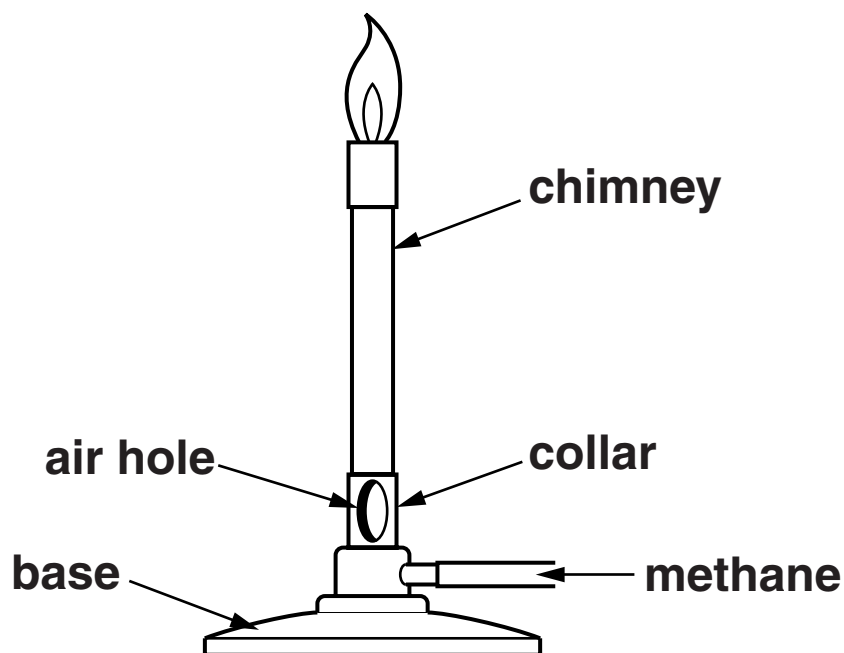
(a) What is the total number of ATOMS in one molecule of butane?

_____ [1]

(b) What is the MOLECULAR formula for propane?

Write your answer in the table. [1]

(c) A Bunsen burner uses methane.



Carolyn heats 100 g of water for 3 minutes. She uses a blue flame.

She works out that the temperature rise of the water is 54 °C.

Carolyn does the experiment again. This time she uses a yellow flame.

Look at her results.

BUNSEN FLAME	TEMPERATURE OF WATER BEFORE HEATING IN °C	TEMPERATURE OF WATER AFTER HEATING IN °C	TEMPERATURE RISE IN °C
blue	15	69	54
yellow	15	41	_____

(i) Complete the table.

[1]

(ii) When the air hole is open the flame is blue.

When the air hole is closed the flame is yellow.

It is better to heat the beaker of water using a blue flame instead of a yellow flame.

Write down TWO reasons why.

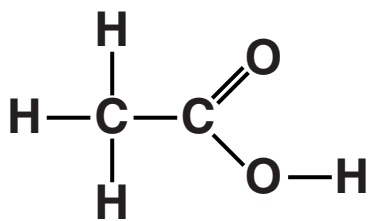
[2]

[Total: 5]

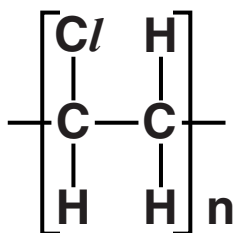
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Question 7 begins on page 20

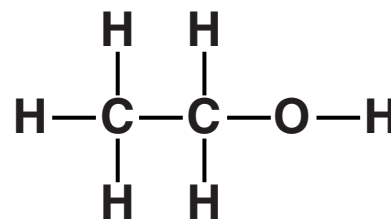
7 Look at the displayed formulas.



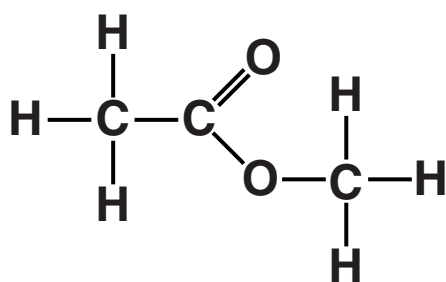
compound A



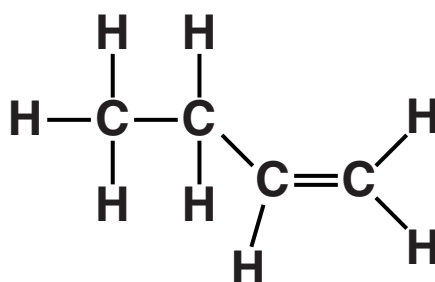
compound B



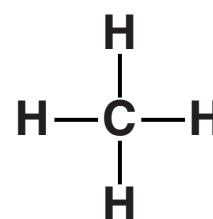
compound C



compound D



compound E



compound F

(a) (i) Which compound is a POLYMER?

Choose from A, B, C, D, E or F.

answer _____ [1]

(ii) Compound F is a HYDROCARBON.

Which other compound is also a hydrocarbon?

Choose from A, B, C, D or E.

answer _____ [1]

(b) Compound D is an ESTER.

(i) Complete the sentence about making an ester.

**Alcohols react with _____ to
make esters and water. [1]**

(ii) Perfumes can be made from synthetic esters.

**Perfumes can also be made using esters from
natural sources.**

**Write down one example of a NATURAL source
of perfume.**

_____ [1]

(iii) We are able to smell perfume.

**What happens in our nose when we smell
perfume?**

_____ [1]

**(iv) Perfumes must be carefully tested before they
are sold.**

Write down ONE reason why.

_____ [1]

[Total: 6]

SECTION C – MODULE P1

- 8 (a) Clare measures the temperature of four objects in her home.

OBJECT	TEMPERATURE °C
ice cream	-3
pan	+200
chicken	-20
gas barbeque	+400

- (i) Which object has the HIGHEST temperature?

answer _____ [1]

(ii) Clare turns the barbeque off.

She takes all four objects into the garden.

The temperature of the air is 22°C.

Which TWO objects will cool down?

Choose from

ICE CREAM

PAN

CHICKEN

GAS BARBEQUE

answer _____ and _____ [2]

(b) Clare takes a hot potato out of the oven.

She wraps the potato in shiny foil.

This shiny foil keeps the potato hot for a long time.

Explain why.

_____ [1]

[Total: 4]

9 Ellie has a mobile phone. She calls her friend who lives in France.

(a) What type of signal does a mobile phone use for phone calls?

Choose from

INFRARED

LIGHT WAVE

MICROWAVE

ULTRAVIOLET

answer _____ [1]

(b) Ellie has photos on her mobile phone.

Ellie wants to put one of the photos onto her laptop.

Some mobile phones use radio waves to transfer data.

Ellie's phone uses ANOTHER type of signal to do this.

What type of signal does Ellie's mobile phone use to transfer photos?

Choose from

INFRARED

LIGHT WAVE

MICROWAVE

ULTRAVIOLET

answer _____ [1]

(c) Ellie uses her mobile phone a lot.

Her mum is worried about it damaging Ellie's health.

Write down ONE possible health risk of using a mobile phone.

_____ [1]

(d) Wireless technology does not use wires.

Write down two OTHER ADVANTAGES of wireless technology.

1 _____

2 _____ **[2]**

[Total: 5]

10 Sun beds give out ultraviolet radiation.

(a) Adam uses the sun bed too much.

This can be harmful.

Describe TWO ways that ultraviolet radiation can harm Adam.

[2]

(b) Jake likes to lie in the sun.

He has two types of sun block.

He has a bottle of low sun protection factor (low SPF) sun block, and a bottle of high sun protection factor (high SPF) sun block.

Jake should use the HIGH SPF sun block.

Explain why.

[2]

[Total: 4]

11 Mrs Powers teaches her class about waves.

She shows them some water waves in a ripple tank.

(a) The water waves have a frequency of 3 Hz.

What does FREQUENCY mean?

_____ [1]

(b) The class measures the water waves.

The waves have a frequency of 3 Hz.

Their wavelength is 0.04 m.

Calculate the SPEED of the waves.

The equations on page 3 may help you.

answer _____ m/s [2]

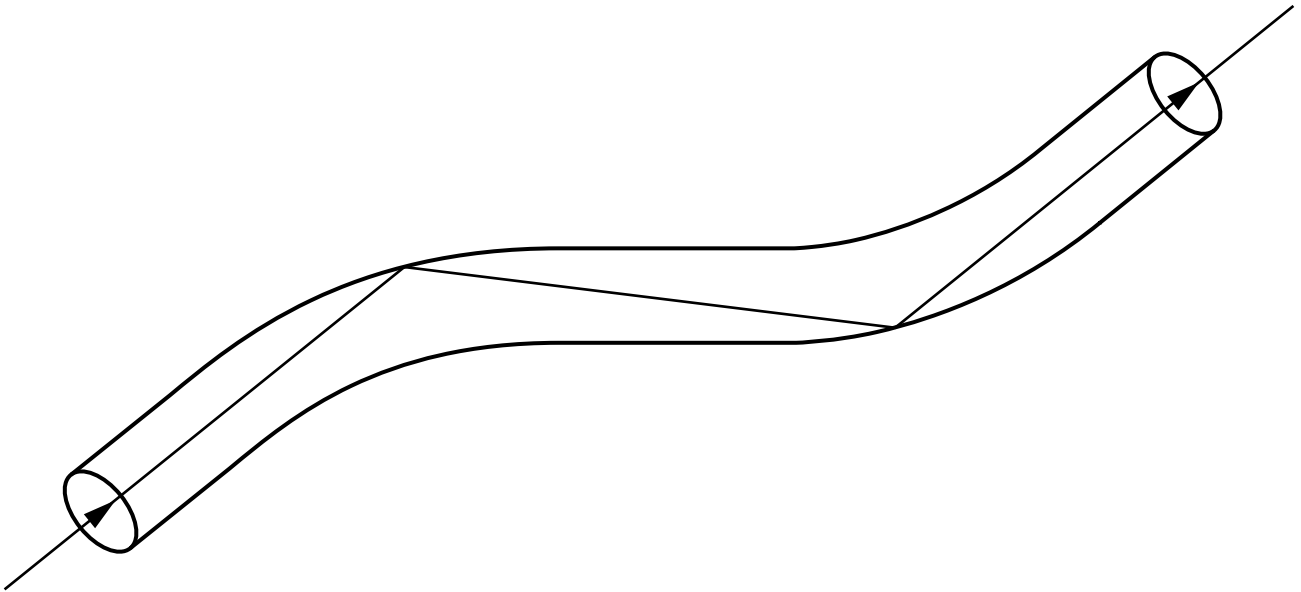
[Total: 3]

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Question 12 begins on page 30

12 Optical fibres can be used to communicate.

Look at the diagram of part of an optical fibre.



(a) Light travels along the optical fibre.

Complete the sentence.

Optical fibres use a process called total internal

_____ .

[1]

(b) Optical fibres normally carry DIGITAL rather than ANALOGUE signals.

Complete the sentences.

DIGITAL signals can be either

_____ **or**

_____ .

ANALOGUE signals have a continuously

_____ .

The light rays in the optical fibre carry data in

_____ **of light. [3]**

[Total: 4]

END OF QUESTION PAPER



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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0	
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 C carbon 6	13 Al aluminium 13	14 N nitrogen 7	15 O oxygen 8	16 F fluorine 9	17 Ne neon 10
	19 K potassium 19	20 Ca calcium 20	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29
	37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium 43	44 Ru ruthenium 44	45 Rh rhodium 45
	55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77
	87 Fr francium 87	88 Ra radium 88	89 Ac* actinium 89	104 Rf rutherfordium 104	105 Db dubnium 105	106 Sg seaborgium 106	107 Bh bohrium 107	108 Hs hassium 108	109 Mt meitnerium 109
	133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77
	199 U uranium 92	201 Pb lead 82	208 Po polonium 84	209 Bi bismuth 83	210 Po polonium 84	210 At astatine 85	210 Rn radon 86	210 Fr francium 87	210 Ac* actinium 89
	223 Fr francium 87	226 Ra radium 88	227 Ac* actinium 89	261 Rf rutherfordium 104	262 Db dubnium 105	266 Sg seaborgium 106	268 Mt meitnerium 109	271 Ds darmstadtium 110	272 Rg roentgenium 111
	285 Fl flerovium 114	286 Mc moscovium 115	287 Lv livermorium 116	288 Ts tennessine 117	289 Og oganeson 118	290 P pennsylvania 119	291 Uu unbinilium 120	292 Uub unbinilium 120	293 Uuq unquincium 121
	315 Uup unpentium 125	315 Uuq unquincium 121	315 Uuh unhexium 122	315 Uuq unquincium 121	315 Uuh unhexium 122	315 Uuq unquincium 121	315 Uuh unhexium 122	315 Uuq unquincium 121	315 Uuh unhexium 122
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	1539 Uuq unquincium 121	1539 Uuh unhexium 122	1539 Uuq unquincium 121	1539 Uuh unhexium 122	1539 Uuq unquincium 121	1539 Uuh unhexium 122	1539 Uuq unquincium 121	1539 Uuh unhexium 122	1539 Uuq unquincium 121
	1587 Uuq unquincium 121	1587 Uuh unhexium 122	1587 Uuq unquincium 121	1587 Uuh unhexium 122	1587 Uuq unquincium 121	1587 Uuh unhexium 122	1587 Uuq unquincium 121	1587 Uuh unhexium 122	1587 Uuq unquincium 121
	1635 Uuq unquincium 121	1635 Uuh unhexium 122	1635 Uuq unquincium 121	1635 Uuh unhexium 122	1635 Uuq unquincium 121	1635 Uuh unhexium 122	1635 Uuq unquincium 121	1635 Uuh unhexium 122	1635 Uuq unquincium 121
	1683 Uuq unquincium 121	1683 Uuh unhexium 122	1683 Uuq unquincium 121	1683 Uuh unhexium 122	1683 Uuq unquincium 121	1683 Uuh unhexium 122	1683 Uuq unquincium 121	1683 Uuh unhexium 122	1683 Uuq unquincium 121
	1731 Uuq unquincium 121	1731 Uuh unhexium 122	1731 Uuq unquincium 121	1731 Uuh unhexium 122	1731 Uuq unquincium 121	1731 Uuh unhexium 122	1731 Uuq unquincium 121	1731 Uuh unhexium 122	1731 Uuq unquincium 121
	1779 Uuq unquincium 121	1779 Uuh unhexium 122	1779 Uuq unquincium 121	1779 Uuh unhexium 122	1779 Uuq unquincium 121	1779 Uuh unhexium 122	1779 Uuq unquincium 121	1779 Uuh unhexium 122	1779 Uuq unquincium 121
	1827 Uuq unquincium 121	1827 Uuh unhexium 122	1827 Uuq unquincium 121	1827 Uuh unhexium 122	1827 Uuq unquincium 121	1827 Uuh unhexium 122	1827 Uuq unquincium 121	1827 Uuh unhexium 122	1827 Uuq unquincium 121
	1875 Uuq unquincium 121	1875 Uuh unhexium 122	1875 Uuq unquincium 121	1875 Uuh unhexium 122	1875 Uuq unquincium 121	1875 Uuh unhexium 122	1875 Uuq unquincium 121	1875 Uuh unhexium 122	1875 Uuq unquincium 121
	1923 Uuq unquincium 121	1923 Uuh unhexium 122	1923 Uuq unquincium 121	1923 Uuh unhexium 122	1923 Uuq unquincium 121	1923 Uuh unhexium 122	1923 Uuq unquincium 121	1923 Uuh unhexium 122	1923 Uuq unquincium 121
	1971 Uuq unquincium 121	1971 Uuh unhexium 122	1971 Uuq unquincium 121	1971 Uuh unhexium 122	1971 Uuq unquincium 121	1971 Uuh unhexium 122	1971 Uuq unquincium 121	1971 Uuh unhexium 122	1971 Uuq unquincium 121
	2019								