



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

SCIENCE (PHYSICS, CHEMISTRY)

5124/01

Paper 1 Multiple Choice

October/November 2011

1 hour

Additional Materials: Multiple Choice Answer Sheet
 Soft clean eraser
 Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

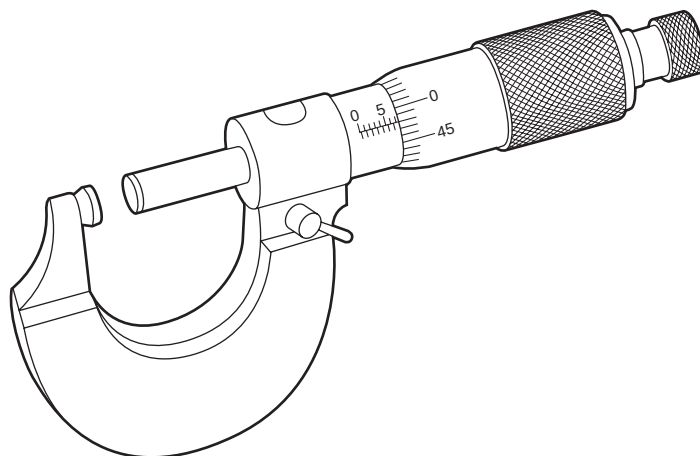
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

This document consists of **14** printed pages and **2** blank pages.



- 1 The diagram shows an instrument used in Physics.



What is the name of this instrument and what is it used to measure?

	name	used to measure
A	calipers	length
B	calipers	pressure
C	micrometer	length
D	micrometer	pressure

- 2 Which car, moving from rest, has an average acceleration of 2.0 m/s^2 ?

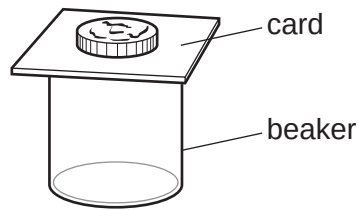
- A** a car reaching a speed of 10 m/s in 2 s
- B** a car reaching a speed of 20 m/s in 5 s
- C** a car reaching a speed of 30 m/s in 10 s
- D** a car reaching a speed of 40 m/s in 20 s

- 3 A force is applied to an object on a frictionless surface. It produces an acceleration of 3 m/s^2 .

What are possible values for the applied force and for the mass of the object?

	force / N	mass / kg
A	2	5
B	2	6
C	5	2
D	6	2

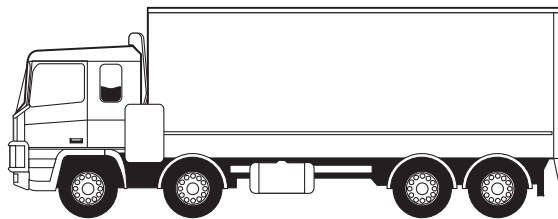
- 4 A coin is placed on top of a beaker, as shown.



If the card is pulled away quickly, the coin does not move sideways but falls into the beaker.

Which property of the coin makes this possible?

- A density
 - B inertia
 - C thickness
 - D volume
- 5 The diagram shows a lorry.

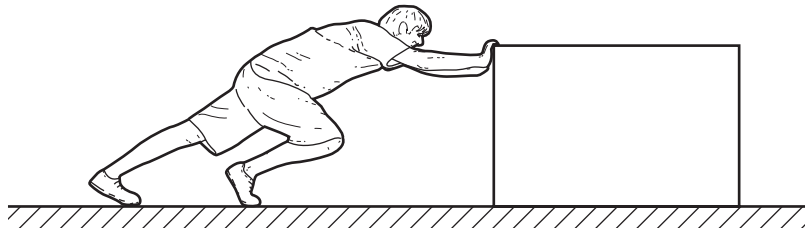


What is the best position for its centre of mass and why is it placed there?

	best position	reason for the position
A	as high as possible	the lorry can accelerate more rapidly
B	as high as possible	the lorry is more stable
C	as low as possible	the lorry can accelerate more rapidly
D	as low as possible	the lorry is more stable

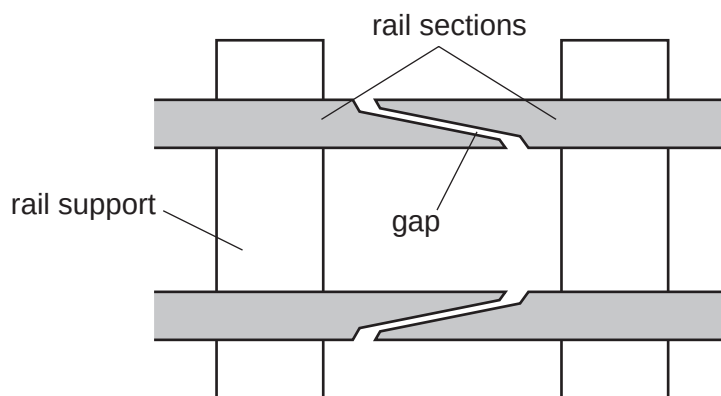
- 6 In an energy transformation sequence, what produces kinetic energy from gravitational potential energy as part of the sequence?
- A burning fuel in a power station
 - B generating hydroelectric energy
 - C generating energy in a nuclear power station
 - D generating energy in a geothermal power station

- 7 A man pushes a heavy box across a floor. He exerts a force of 80 N and the box moves 4.0 m in 5.0 seconds.



What useful power does the man develop?

- A** 4.0 W **B** 64 W **C** 100 W **D** 1600 W
- 8 Which property is essential to a clinical thermometer?
- A** It contains mercury.
B It has a constriction in its bore.
C It has a range of 40 °C.
D It is accurate to 0.001 °C.
- 9 At regular intervals along a railway line there is a gap between the rail sections.



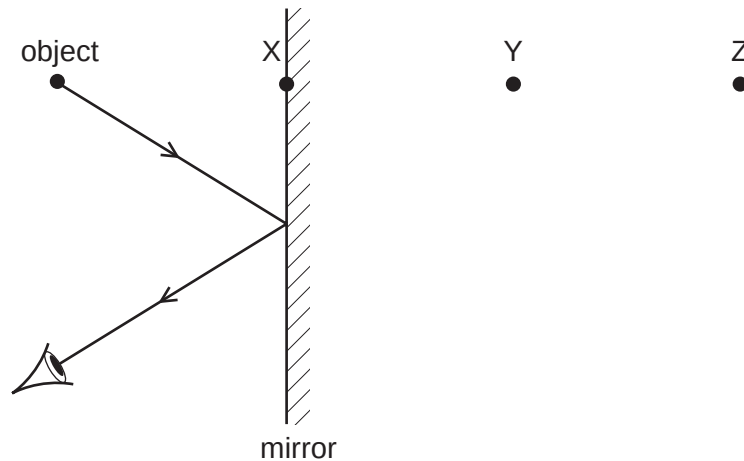
What is the reason for the gap between the rail sections?

- A** to allow for expansion of the rail sections during hot weather
B to allow for vibrations of the rail sections as the train passes over them
C to allow rain water to drain from the rail sections
D to keep the wheels of the train and carriages on the rail sections
- 10 A VHF radio station broadcasts at a frequency of 60 MHz (6.0×10^7 Hz). The speed of radio waves is 3.0×10^8 m/s.

What is the wavelength of the waves broadcast by the station?

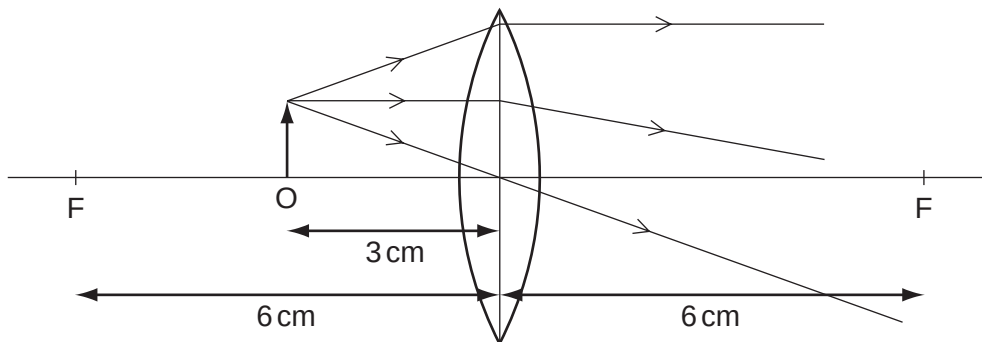
- A** 5.0 m **B** 2.0 m **C** 0.5 m **D** 0.2 m

- 11 The diagram shows the reflection of a ray of light from an object in a plane mirror.



Which statement is correct?

- A The image is at X.
 - B The image is between X and Y.
 - C The image is at Y.
 - D The image is between Y and Z.
- 12 The diagram shows an object O placed 3 cm away from a converging lens of focal length 6 cm.



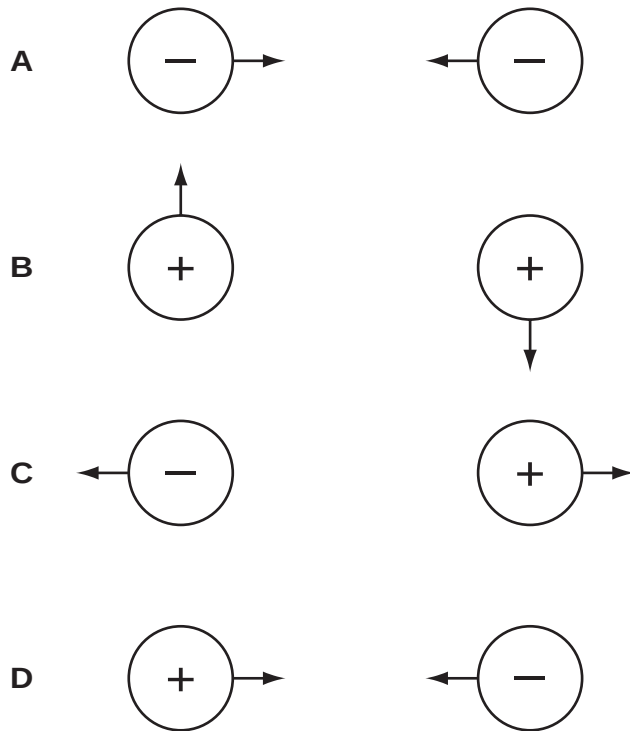
What type of image is produced?

- A real, upright and diminished
- B real, inverted and magnified
- C virtual, upright and magnified
- D virtual, inverted and diminished

13 What is an approximate value of the speed of sound in air under normal atmospheric conditions?

- A $3 \times 10^8 \text{ cm/s}$
- B $3 \times 10^6 \text{ cm/s}$
- C $3 \times 10^4 \text{ cm/s}$
- D $3 \times 10^2 \text{ cm/s}$

14 Which diagram correctly shows the directions of the electrostatic forces on a pair of charged spheres?



15 A conductor carries a current of 2.0 A.

How long does it take for 10 C of charge to pass one point in the conductor?

- A 0.20 s
- B 5.0 s
- C 12 s
- D 20 s

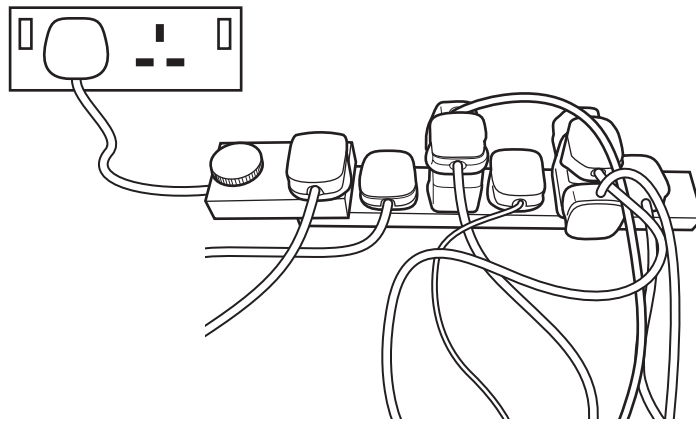
16 A constant-voltage source is connected to a resistor which has a current I through it.

Two more identical resistors are then added in series with the first.

What is the current now?

- A $\frac{I}{4}$
- B $\frac{I}{3}$
- C I
- D $3I$

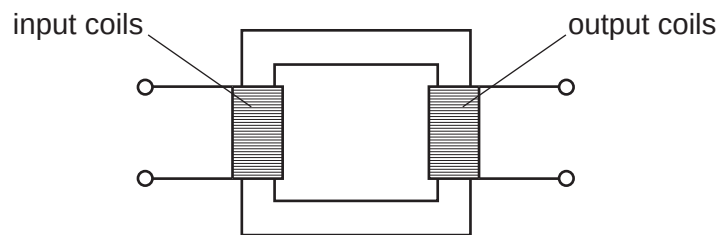
17 The diagram shows an unsafe use of an extension cable.



What is the electrical hazard?

- A the danger of burning out the appliances
- B the danger of melting the fuse
- C the danger of overheating the cable
- D the danger of the appliances not being earthed

18 The transformer in the diagram has an input coil with N_i turns and an output coil with N_o turns.



The output voltage needs to be lower than the input voltage.

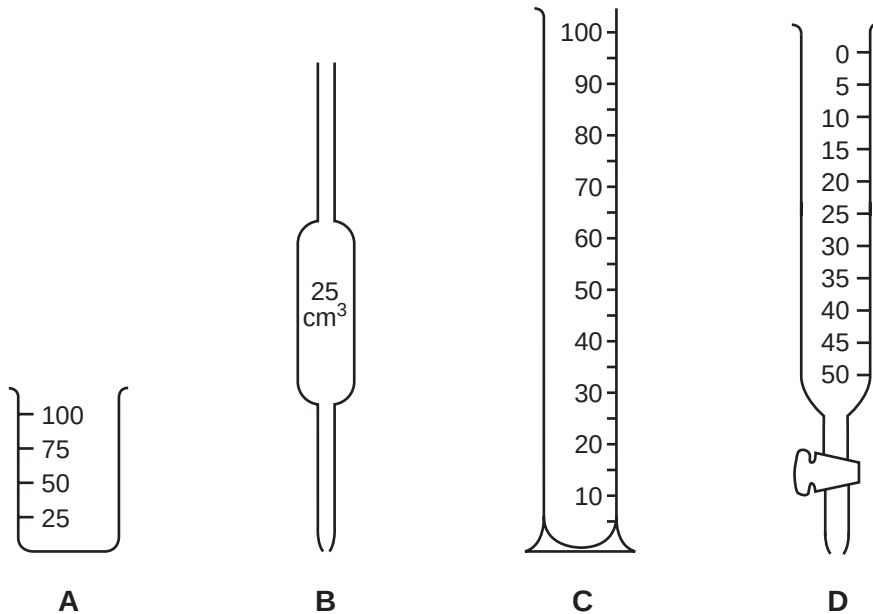
What is needed for the transformer to work correctly?

	input supply	relative values of N_i and N_o
A	a.c.	$N_i > N_o$
B	a.c.	$N_i < N_o$
C	d.c.	$N_i > N_o$
D	d.c.	$N_i < N_o$

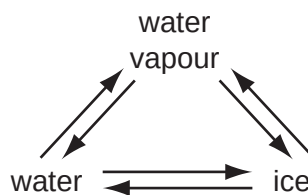
19 What is the relationship between the number of electrons, neutrons and protons in a neutral atom of $^{14}_6\text{C}$? (n = number of neutrons, p = number of protons, e = number of electrons)

- A $n > p, p = e$
- B $n = p, p > e$
- C $n = p, p < e$
- D $n < p, p = e$

- 20 When a radioactive nucleus decays by alpha-particle emission, it loses
- A 1 proton and 1 electron.
 - B 1 proton only.
 - C 2 protons and 2 electrons.
 - D 2 protons and 2 neutrons.
- 21 Which piece of apparatus would be most suitable to measure accurately the volume of acid needed to neutralise 25.0 cm^3 of an alkali?



- 22 In which conversion do water molecules lose speed?



- A ice → water
- B ice → water vapour
- C water vapour → ice
- D water → water vapour

- 23 An atom of element X is represented by ${}^7_3\text{X}$.

Which statement about this atom of X is correct?

- A It is in Group III of the Periodic Table.
 - B It is in Group VII of the Periodic Table.
 - C The total number of protons and electrons is 6.
 - D The total number of protons and neutrons is 10.
- 24 How does a magnesium atom form a bond with an oxygen atom?
- A by giving two electrons to the oxygen atom
 - B by sharing one pair of electrons
 - C by sharing two pairs of electrons
 - D by taking two electrons from the oxygen atom
- 25 The table shows the electronic structures of four elements.

element	electronic structure
W	2, 6
X	2, 8
Y	2, 8, 1
Z	2, 8, 7

Which pair of atoms form a covalent molecule?

- A two atoms of W
 - B two atoms of X
 - C an atom of W and an atom of X
 - D an atom of Y and an atom of Z
- 26 A substance contains the ions X^{4+} and Y^{2-} .

What is the simplest formula of the compound containing the ions X^{4+} and Y^{2-} ?

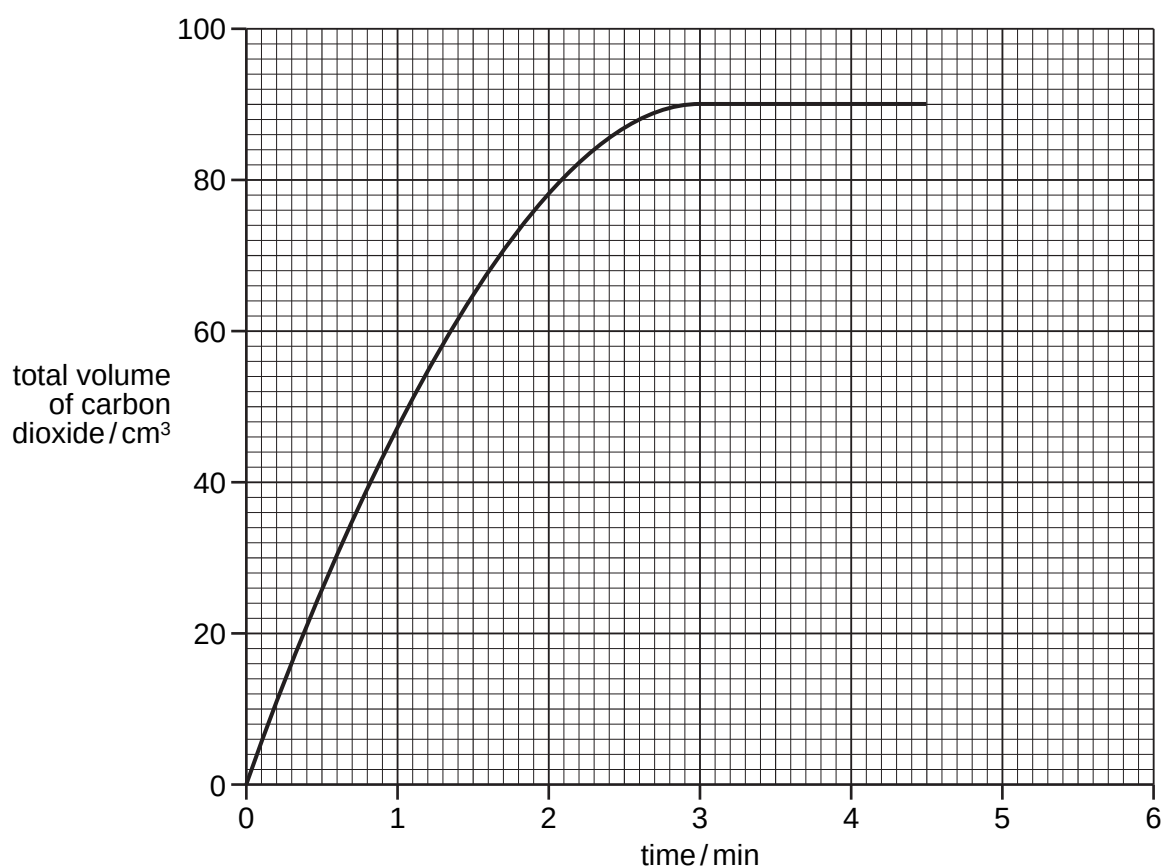
- A XY_2
- B X_2Y
- C X_2Y_4
- D X_4Y_2

27 Which process is endothermic?

- A the formation of a hydrogen-chlorine bond
- B the formation of silver from silver salts in photography
- C the formation of water from oxygen and hydrogen
- D the formation of water from steam

28 The rate of the reaction between a given mass of calcium carbonate and an excess of hydrochloric acid is studied by collecting the carbon dioxide in a graduated syringe.

The results are shown in the graph.



How much time is required for half the calcium carbonate to react?

- A 0.95 min B 1.5 min C 2.0 min D 3.0 min

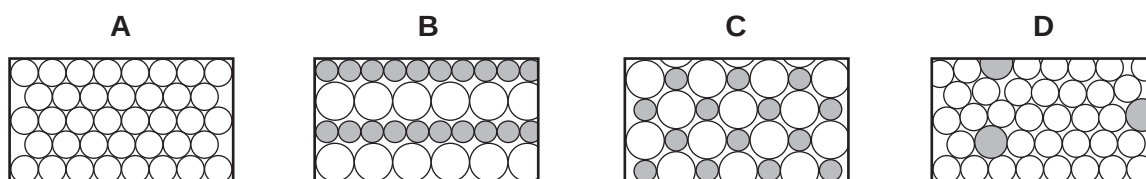
29 Which statement about all acids is correct?

- A They contain both hydrogen and oxygen.
- B They give ammonia with an ammonium salt.
- C They have a pH value below 7.
- D They react with all metals to form hydrogen.

30 What are the properties of bromine?

	state at room temperature	result of adding bromine to aqueous potassium iodide
A	gas	no reaction
B	gas	reaction
C	liquid	no reaction
D	liquid	reaction

31 Which diagram represents the structure of an alloy?



32 Water is formed when hydrogen is passed over the heated oxide of metal X.

No water is formed when hydrogen is passed over the heated oxide of metal Y.

What is the order of reactivity of hydrogen, metal X and metal Y?

	most reactive	—————→	least reactive
A	hydrogen	X	Y
B	X	hydrogen	Y
C	X	Y	hydrogen
D	Y	hydrogen	X

33 Aluminium is used to make saucepans because of its apparent lack of reactivity.

Which property of aluminium explains its unreactivity?

- A** It has a high electrical conductivity.
- B** It has a layer of oxide on its surface.
- C** It has a low density.
- D** It is in Group III of the Periodic Table.

34 Ammonia may be obtained from ammonium chloride by heating with

- A aqueous calcium chloride.
- B aqueous sodium hydroxide.
- C dilute hydrochloric acid.
- D water.

35 The table shows the boiling point ranges of fractions collected from distillation of a sample of petroleum (crude oil).

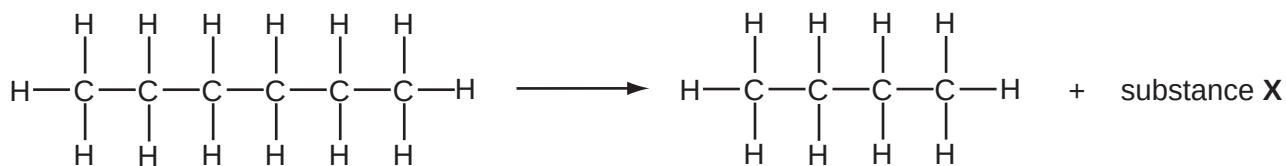
Which fraction contains the smallest molecules?

fraction	boiling point range
A	20 – 50°C
B	50 – 100°C
C	100 – 150°C
D	150 – 250°C

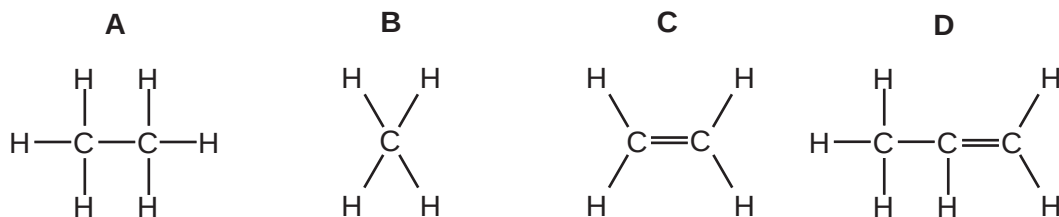
36 Which is the molecular formula of an alkane?

- A** C₃H₆ **B** C₄H₁₀ **C** C₆H₁₂ **D** C₇H₁₈

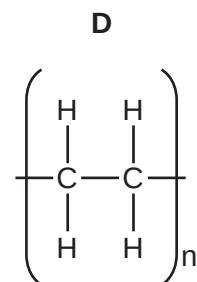
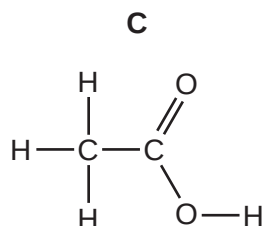
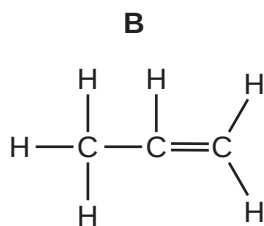
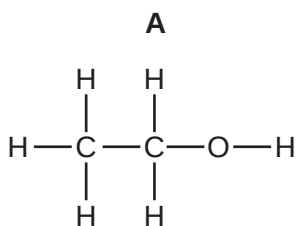
37 The equation shows a molecule of hexane being cracked into two smaller molecules by heating to a high temperature.



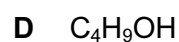
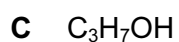
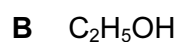
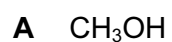
What is the structure of substance **X**?



38 Which substance turns aqueous bromine from brown to colourless?



39 Which substance can be oxidised to form ethanoic acid?



40 What is formed when proteins are hydrolysed?

A alcohols

B amino acids

C esters

D fats

DATA SHEET
The Periodic Table of the Elements

Group

I

II

III

IV

V

VI

VII

0

1

H

Hydrogen

4

He

Helium

7

Li

Lithium

9

Be

Beryllium

11

Na

Sodium

19

K

Potassium

37

Rb

Rubidium

55

Cs

Cesium

87

Fr

Francium

23

Na

Sodium

24

Mg

Magnesium

39

K

Potassium

85

Rb

Rubidium

133

Cs

Cesium

40

Ca

Calcium

45

Sc

Scandium

88

Sr

Strontium

137

Ba

Barium

48

Ti

Titanium

51

V

Vanadium

89

Y

Yttrium

139

La

Lanthanum

52

Cr

Chromium

55

Mn

Manganese

91

Zr

Zirconium

141

Pr

Praseodymium

56

Fe

Iron

59

Co

Cobalt

101

Ru

Ruthenium

150

Sm

Samarium

64

Cu

Copper

65

Zn

Zinc

106

Pd

Palladium

157

Gd

Gadolinium

72

Hf

Hafnium

73

Ta

Tantalum

108

Ag

Silver

162

Dy

Dysprosium

74

W

Tungsten

76

Os

Osmium

112

Cd

Cadmium

166

Ho

Holmium

77

Ir

Iridium

78

Pt

Platinum

115

In

Indium

167

Er

Erbium

79

Au

Gold

80

Hg

Mercury

119

Sn

Tin

173

Yb

Ytterbium

81

Tl

Thallium

82

Pb

Lead

122

Sb

Antimony

177

Lu

Lutetium

83

Bi

Bismuth

84

Po

Polonium

127

Te

Tellurium

181

Re

Rhenium

85

At

Astatine

86

Rn

Radon

128

I

Iodine

183

Os

Osmium

88

Ra

Radium

89

Ac

Actinium

131

Xe

Xenon

187

Fr

Francium

90

Th

Thorium

91

Pa

Protactinium

132

U

Uranium

188

Ac

Actinium

92

U

Uranium

93

Np

Neptunium

134

Pu

Plutonium

189

Th

Thorium

94

Pu

Plutonium

95

Am

Americium

136

Cm

Curium

190

Pa

Protactinium

96

Cm

Curium

97

Bk

Berkelium

138

Bk

Berkelium

192

U

Uranium

98

Cf

Californium

99

Es

Einsteinium

140

Ce

Cerium

194

Th

Thorium

100

Fm

Fermium

101

Md

Mendelevium

142

Pr

Praseodymium

196

Pa

Protactinium

102

No

Nobelium

103

Lr

Lawrencium

144

Nd

Neodymium

198

U

Uranium

104

Lr

Lawrencium

105

Uub

Ununseptium

146

Pm

Promethium

200

Np

Neptunium

106

Uub

Ununseptium

107

Uuh

Ununseptium

148

Sm

Samarium

202

Pu

Plutonium

108

Uuh

Ununseptium

109

Uuu

Ununseptium

150

Eu

Europium

204

Am

Americium

110

Uuu

Ununseptium

111

Uuq

Ununseptium

152

Gd

Gadolinium

206

Cm

Curium

112

Uuq

Ununseptium

113

Uuq

Ununseptium

154

Tb

Terbium

208

Bk

Berkelium

114

Uuq

Ununseptium

115

Uuq

Ununseptium

156

Dy

Dysprosium

210

Cf

Californium

116

Uuq

Ununseptium

117

Uuq

Ununseptium

158

Ho

Holmium

212

Es

Einsteinium

118

Uuq

Ununseptium

119

Uuq

Ununseptium

160

Er

Erbium

214

Fm

Fermium

120

Uuq

Ununseptium

121

Uuq

Ununseptium

162

Tm

Thulium

216

Md

Mendelevium

122

Uuq

Ununseptium

123

Uuq

Ununseptium

164

Yb

Ytterbium

218

No

Nobelium

124

Uuq

Ununseptium

125

Uuq

Ununseptium

166

Lu

Lutetium

220

Lr

Lawrencium

126

Uuq

Ununseptium

127

Uuq

Ununseptium

168

Yb

Ytterbium

222

Lr

Lawrencium

128

Uuq

Ununseptium

129

Uuq

Ununseptium

170

Yb

Ytterbium

224

Lr

Lawrencium

130

Uuq

Ununseptium

131

Uuq

Ununseptium

172

Yb

Ytterbium

226

Lr

Lawrencium

132

Uuq

Ununseptium

133

Uuq

Ununseptium

174

Yb

Ytterbium

228

Lr

Lawrencium

134

Uuq

Ununseptium

135

Uuq

Ununseptium

176

Yb

Ytterbium

230

Lr

Lawrencium

136

Uuq

Ununseptium

137

Uuq

Ununseptium

178

Yb

Ytterbium

232

Lr

Lawrencium

138

Uuq

Ununseptium

139

Uuq

Ununseptium

180

Yb

Ytterbium

234

Lr

Lawrencium

140

Uuq

Ununseptium

141

Uuq

Ununseptium

182

Yb

Ytterbium

236

Lr

Lawrencium

142

Uuq

Ununseptium

143

Uuq

Ununseptium

184

Yb

Ytterbium

238

Lr

Lawrencium

144

Uuq

Ununseptium

145

Uuq

Ununseptium

186

Yb

Ytterbium

240

Lr

Lawrencium

146

Uuq

Ununseptium

147

Uuq

Ununseptium

188

Yb

Ytterbium

242

Lr

Lawrencium

148

Uuq

Ununseptium

149

Uuq

Ununseptium

190

Yb

Ytterbium

244

Lr

Lawrencium

150

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192

Yb

Ytterbium

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Lawrencium

152

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Yb

Ytterbium

248

Lr

Lawrencium

154

Uuq

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Uuq

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196

Yb

Ytterbium

250

Lr

Lawrencium

156

Uuq

Ununseptium

157

Uuq

Ununseptium

198

Yb

Ytterbium

252

Lr

Lawrencium

158

Uuq

Ununseptium

159

Uuq

Ununseptium

200

Yb

Ytterbium

254

Lr

Lawrencium

160

Uuq

Ununseptium

161

Uuq

Ununseptium

202

Yb

Ytterbium

256

Lr

Lawrencium

162

Uuq

Ununseptium

163

Uuq

Ununseptium

204

Yb

Ytterbium

258

Lr

Lawrencium

164

Uuq

Ununseptium

165

Uuq

Ununseptium

206

Yb

Ytterbium

260

Lr

Lawrencium

166

Uuq

Ununseptium

167

Uuq

Ununseptium

208

Yb

Ytterbium

262

Lr

Lawrencium

168

Uuq

Ununseptium

169

Uuq

Ununseptium

210

Yb

Ytterbium

264

Lr

Lawrencium

170

Uuq

Ununseptium

171

Uuq

Ununseptium

212

Yb

Ytterbium

266

Lr

Lawrencium

172

Uuq

Ununseptium

173

Uuq

Ununseptium

214

Yb

Ytterbium

268

Lr

Lawrencium

174

Uuq

Ununseptium

175

Uuq

Ununseptium

216

Yb

Ytterbium

270

Lr

Lawrencium

176

Uuq

Ununseptium

177

Uuq

Ununseptium

218

Yb

Ytterbium

272

Lr

Lawrencium

178

Uuq

Ununseptium

179

Uuq

Ununseptium

220

Yb

Ytterbium

274

Lr

Lawrencium

180

Uuq

Ununseptium

181

Uuq

Ununseptium

222

Yb

Ytterbium

276

Lr

Lawrencium

182

Uuq

Ununseptium

183

Uuq

Ununseptium

224

Yb

Ytterbium

278

Lr

Lawrencium

184

Uuq

Ununseptium

185

Uuq

Ununseptium

226

Yb

Ytterbium

280

Lr

Lawrencium

186

Uuq

Ununseptium

187

Uuq

Ununseptium

228

Yb

Ytterbium

282

Lr

Lawrencium

188

Uuq

Ununseptium

189

Uuq

Ununseptium

230

Yb

Ytterbium

284

Lr

Lawrencium

190

Uuq

Ununseptium

191

Uuq

Ununseptium

232

Yb

Ytterbium

286

Lr

Lawrencium

192

Uuq

Ununseptium

193

Uuq

Ununseptium

234

Yb

Ytterbium

288

Lr

Lawrencium

194

Uuq

Ununseptium

195

Uuq

Ununseptium

236

Yb

Ytterbium

290

Lr

Lawrencium

196

Uuq

Ununseptium

197

Uuq

Ununseptium

238

Yb

Ytterbium

292

Lr

Lawrencium

198

Uuq

Ununseptium

199

Uuq

Ununseptium

240

Yb

Ytterbium

294

Lr

Lawrencium

200

Uuq

Ununseptium

201

Uuq

Ununseptium

242

Yb

Ytterbium

296

Lr

Lawrencium

202

Uuq

Ununseptium

203

Uuq

Ununseptium

244

Yb

Ytterbium

298

Lr

Lawrencium

204

Uuq

Ununseptium

205

Uuq

Ununseptium

246

Yb

Ytterbium

300

Lr

Lawrencium

206

Uuq

Ununseptium

207

Uuq

Ununseptium

248

Yb

Ytterbium

302

Lr

Lawrencium

208

Uuq

Ununseptium

209

Uuq

Ununseptium

250

Yb

Ytterbium

304

Lr

Lawrencium

210

Uuq

Ununseptium

211

Uuq

Ununseptium

252

Yb

Ytterbium

306

Lr

Lawrencium

212

Uuq

Ununseptium

213

Uuq

Ununseptium

254

Yb

Ytterbium

308

Lr

Lawrencium

214

Uuq

Ununseptium

215

Uuq

Ununseptium

256

Yb

Ytterbium

310

Lr

Lawrencium

216

Uuq

Ununseptium

217

Uuq

Ununseptium

258

Yb

Ytterbium

312

Lr

Lawrencium

218

Uuq

Ununseptium

219

Uuq

Ununseptium

260

Yb

Ytterbium

314

Lr

Lawrencium

220

Uuq

Ununseptium

221

Uuq

Ununseptium

262

Yb

Ytterbium

316

Lr

Lawrencium

222

Uuq

Ununseptium

223

Uuq

Ununseptium

264

Yb

Ytterbium

318

Lr

Lawrencium

224

Uuq

Ununseptium

225

Uuq

Ununseptium

266

Yb

Ytterbium

320

Lr

Lawrencium

226

Uuq

Ununseptium

227

Uuq

Ununseptium

268

Yb

Ytterbium

322

Lr

Lawrencium

228

Uuq

Ununseptium

229

Uuq

Ununseptium

270

Yb

Ytterbium

324

Lr

Lawrencium

230

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Ununseptium

231

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272

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Ytterbium

326

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Lawrencium

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Ytterbium

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Ytterbium

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Lawrencium

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237

Uuq

Ununseptium

278

Yb

Ytterbium

332

Lr

Lawrencium

238

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Ununseptium

239

Uuq

Ununseptium

280

Yb

Ytterbium

334

Lr

Lawrencium

240

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Ununseptium

241

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Ytterbium

336

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Lawrencium

242

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Yb

Ytterbium

338

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Lawrencium

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286

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Ytterbium

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Lawrencium

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247

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Ununseptium

288

Yb

Ytterbium

342

Lr

Lawrencium

248

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Ununseptium

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Uuq

Ununseptium

290

Yb

Ytterbium

344

Lr

Lawrencium

250

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Ununseptium

251

Uuq

Ununseptium

292

Yb

Ytterbium

346

Lr

Lawrencium

252

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Ununseptium

253

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Ununseptium

294

Yb

Ytterbium

348

Lr

Lawrencium

254

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Ununseptium

255

Uuq

Ununseptium

296

Yb

Ytterbium

350

Lr

Lawrencium

256

Uuq

Ununseptium

257

Uuq

Ununseptium

298

Yb

Ytterbium

352

Lr

Lawrencium

258

Uuq

Ununseptium

259

Uuq

Ununseptium

300

Yb

Ytterbium

354

Lr

Lawrencium

260

Uuq

Ununseptium

261

Uuq

Ununseptium

302

Yb

Ytterbium

356

Lr

Lawrencium

262

Uuq

Ununseptium

263

Uuq

Ununseptium

304

Yb

Ytterbium

358

Lr

Lawrencium

264

Uuq

Ununseptium

265

Uuq

Ununseptium

306

Yb

Ytterbium

360

Lr

Lawrencium

266

Uuq

Ununseptium

267

Uuq

Ununseptium

308

Yb

Ytterbium

362

Lr

Lawrencium

268

Uuq

Ununseptium

269

Uuq

Ununseptium

310

Yb

Ytterbium

364

Lr

Lawrencium

270

Uuq

Ununseptium

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Uuq

Ununseptium

312

Yb

Ytterbium

366

Lr