OCR
RECOGNISING ACHIEVEMENT

GCSE

Science B J640

Gateway Science Suite

General Certificate of Secondary Education

Report on the Units

January 2008

J640/R/08J

Oxford Cambridge and RSA Examinations

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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General Certificate of Secondary Education

Gateway Science B (J640)

REPORT ON THE UNITS

B621/01 Foundation Tier

General Comments

The cohort for this Foundation Tier examination paper was a mixture of candidates most of who were in Year 10 taking the examination for the first time and a much smaller proportion of candidates who were retaking the examination. Centres entry policy was very well targeted with only a very small proportion of candidates whose performance suggested that they should have taken the Higher examination paper.

The mean mark for the examination paper was 32 and the highest mark awarded was 57 out of 60. The examination successfully discriminated between the target grades (G to C). The examination paper allowed candidates to effectively demonstrate their understanding of scientific principles. In addition there were opportunities for candidates to evaluate and interpret data, communicate scientific ideas and to describe some of the implications of science to society.

Section A (Sc2) was the most demanding section of the examination paper. Nevertheless statistical analysis indicated that all three sections discriminated equally well.

There was little evidence that candidates did not have sufficient time to finish the examination paper. Although the majority of candidates answered in the provided spaces there were a number of candidates who put there answers in different places. Candidates need to be advised of the importance of only answering in the appropriate spaces in the examination paper.

Comments on Individual Question

1 This question was about body temperature.

(a) A large proportion of candidates were able to describe the use of a thermometer to measure body temperature. Most of these candidates mentioned putting the thermometer in the mouth. Only a small number of candidates referred to thermochromic strips.
(b) A large proportion of candidates were able to quote 37^{o}C.
(c) A significant proportion of candidates misinterpreted the question and described what Jermaine could do eg move to a cold room, use a cold flannel, rather than describing how his body could change. If a mark was awarded it was almost invariably for sweating.

2 Although two parts of this question was targeted at low demand this was the least accessible question on the examination paper. The least used words were dominant and recessive and a frequent incorrect answer in (a) was gene, in (b) was DNA and in (c) was cell.

3 This question on food and diet was the most accessible question in the examination paper.

(a) Almost all the candidates could state a health risk the most popular being heart disease.
(b) An extremely large proportion of the candidates were able to interpret the data in the table in parts (i) and (ii). In part (iii) there was very little evidence in the scripts that candidates calculated the correct percentage of 40%. Common errors were 4 and 40%.

4 This question was about contraception and how new methods of treatment are tested.

(a) A significant proportion of candidates did not attempt this question and many of those who did were unable to name a correct hormone. The mark scheme did not allow female sex hormone.
(b) In part (i) although many candidates correctly identified the immune system a common misconception was the excretory system. A significant proportion of candidates in (ii) gave one of the responses from part (ii).
(c) Many candidates transferred their knowledge of the reasons for testing cosmetics in part (i) and a large proportion of candidates were awarded a mark. Candidates found part (ii) the most difficult part question in Section A and a significant proportion did not attempt the question. Common misconceptions were to test dead animals or live plants. Only an extremely small proportion of candidates referred to computer simulations.

5 This question used the context of an artificial arm to test knowledge of nerves and reflex action.

(a) Many candidates correctly stated that electrical impulses are passes along nerves.
(b) A significant proportion of candidates were able to name a part of the CNS but a common misconception was the spine rather than the spinal column.
(c) Although the candidates only had to choose from a list of three a large proportion chose sensory neurone rather than motor neurone.
(d) Only a very small proportion of candidates were able to articulate that an artificial arm will not have any nerves. For the vast majority of candidates the context acted as a barrier to answering the question.

6 This question was about fossil fuels and was one of the most accessible on the examination paper.

(a) In part (i) although many candidates could recall that fractional distillation is used to separate crude oil a significant proportion of candidates thought it was decomposition.

Although many candidates in part (ii) recognised petrol and diesel as fractions obtained from crude oil a significant proportion of candidates did not even get one of the substances correct.

(b) Coal was the correct answer to both parts (i) and (ii) and only a very small proportion of the candidates were not able to interpret the given data.

7 This was a question about cooking and foods and was common to the Higher Tier examination paper.

(a) An extremely large proportion of the candidates were able to recognise that bread contains a lot of carbohydrate. A small proportion of the candidates stated fish.
(b) Although both chicken and fish were correct answers almost all the candidates chose fish.
(c) Very good answers referred to killing bacteria, denaturing proteins or making food easier to digest. Other answers given credit including improving the texture and taste of the food. Any reference to germs was ignored.

8 This question was about the displayed formulae of some organic compounds.

(a) A common misconception was to give the number of different types of atoms rather than 11 the total number of atoms in the molecule.
(b) A common misconception was to give the total number of atoms in the molecule.
(c) Many candidates were able to choose either compound A or D.
(d) Many candidates could not recognise an alkene.
(e) This was the hardest part question in question eight and only a small proportion of candidates selected compound E. Common incorrect answers were A and D.

9 This question was about the combustion of methane in a Bunsen burner.

(a) Only a small proportion of candidates managed to recall that oxygen was needed for combustion. There was little evidence that candidates used the word equation to help them answer the question. Carbon dioxide was a common misconception.
(b) Only a very small proportion of candidates realised the significance of carbon dioxide as a product in the word equation. A common misconception was to state that there was complete combustion because the flame was blue, making no reference to the word equation. A significant proportion of candidates did not attempt this question.
(c) A significant proportion of candidates did not attempt part (i) and only a small proportion could identify carbon or soot. A common misconception was to call the black solid coal or charcoal. Many candidates in part (ii) realised that carbon monoxide was a toxic gas. Damage to the lungs was not given credit.

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11 This question was about nail varnish remover and many candidates were awarded at least one mark.

12 This question was about energy transfer.

(a) Most of the candidates were able to state that temperature was measured in ^{o}C.
(b) In part (i) very few candidates were able to explain it was because the blocks were made of different metals. A much larger proportion of candidates appreciated that it was the increase in mass that was the important factor in part (ii).
(c) Although this was a prompted recall question candidates found it very difficult. A frequent misconception was that foam insulation reduces heat loss by conduction.

12 This question was also about energy transfer.

(a) Although many candidates were awarded full marks a common misconception was to muddle up the direction of heat transfer and have it going from the room into the water.
(b) Since the appropriate equation on page 2 did not refer to percentage efficiency both 0.6 and 60% were given full marks. A significant proportion of candidates did not attempt this question.

13 This question was about wireless technology.

(a) Many candidates were able to give two advantages of wireless connections, referring to the lack of wires and its portability.
(b) Many candidates chose the correct answer infra-red with other candidates normally choosing ultra-violet.
(c) No error carried forward was given for part (ii). The most popular correct answers referred to remote controls.

14 This question was about protection from ultra-violet radiation from the Sun.

(a) Many candidates referred to cataracts or skin cancer. Cancer on its own was not given credit.
(b) In part (i) only a very small proportion of the candidates were able to calculate that the safe time was 75 minutes.

Good answers to part (ii) stated that with Bronze Blush the exposure time will be doubled and so the risk of skin cancer was reduced. A mark was also awarded for stating that the exposure time would be longer.

B621/02 Higher Tier

General Comments

Most candidates performed to a good standard throughout the paper, with levels of performance in the three sections of the paper being fairly comparable. This resulted in candidates gaining a good spread of marks across the paper. Most candidates attempted all the paper and there was no indication of candidates not reaching the end in the time allowed. The grammar and punctuation were appropriate to this level of examination and with few exceptions, there were no problems in interpreting the writing.

Few scripts were seen where the mark was below 20, although a handful below 10 were in evidence. These candidates would obviously have benefited from a foundation tier entry.

Comments on Individual Questions

1 (a) What was hoped to be a relatively accessible starter question did not always prove to be so with frequent crossing out indicating quite a bit of indecision.

(b) Generally well answered. Those candidates who went into more detail often negated correct answers with incorrect references to the brain. Common errors were to say the response would be slower or there were less neurones.

2 (a) (i) Gene was not well known, the most common error being DNA.

(ii) Correct answers were slightly more common here but again DNA featured on many scripts.

(b) A small number of candidates gained all three marks here but the majority only gained one, for dark.

3 (a) Well answered by many candidates, although spelling was not always accurate. There were a few answers that combined the words oestrogen with progesterone. The most common errors were testosterone, insulin and depressants.

(b) This was not well understood at all. Few candidates referred to specificity and there were virtually no references to the idea of complementary shapes. The most common error was to repeat the question. Some candidates simply stated that was what they were designed to do or even that the proteins help sperm grow.

(c) (i) The mark scheme was very accessible and most candidates gained a mark here, usually for reference to the prevention of harm.

(ii) Many candidates referred to cells, tissues or computers but a number of answers referred to dead plants or animals. A small number of answers suggested using convicts or even blind people.

4 (a) Very poorly answered. The examiners were looking for knowledge of receptor sites at synapses but the number of correct responses was extremely low.

(b) In contrast, this part was answered well and very few candidates failed to gain this mark, the most common error was just saying cigarettes are addictive.

(c) Quite well answered with many candidates gaining both marks. The most common error was to divide 100 by 1.7 to get 58.8 but even these candidates were able to gain an error carried forward mark. A few candidates referred to over 30kg weight not BMI.

5 (a) Well answered. Very few candidates incorrectly gave figures or years from the graph for the answers.

(b) Only a small number of candidates gained both marks here. Common errors were that malignant cancers keep growing but benign stop growing instead of referring to how quickly they grow or that benign tumours can be cut out but malignant cannot. More candidates gained the mark for rate of spread, although a few referred to tumours moving or spreading into cells nearby ie growth rather than to other parts. There were many vague references to malignant tumours causing more harm than benign.

6 (a) Quite well answered. The most common errors were on top and bottom pipes, although some candidates did put the cross outside the tower.

(b) Most candidates were able to get both marks, occasional errors were 'weaker' and 'flammability'.

(c) This was quite well understood. The most common errors involved simply stating larger molecules are broken down into small ones or a failure to give a comparative answer eg make useful chemicals like petrol.

7 (a) Well answered overall, with only a few references to apples and butter.

(b) Almost all candidates knew this.

(c) Most candidates easily gained both marks here and often included more marking points. One error was for candidates to state that food contained bacteria and / or could cause food poisoning but failed to state how cooking affected this.

8 Many candidates gained all 4 marks on this question.

9 (a) Generally well answered. The formulae were well known and most were able to correctly identify the compounds on each side but the balancing was more of a discriminator. There were only a small number of candidates who lost marks for not using subscripts.

(b) This was poorly answered with too many vague references to dangerous / harmful gases, the flame giving out less heat or taking longer to heat things. Even better candidates who correctly identified carbon monoxide did not always use the term poisonous or toxic. Soot and carbon were not seen very often. A common error was to state that not all the methane had been burnt so it was released into / polluted the air. Other candidates stated that carbon dioxide was produced.

(c) Generally well answered by most candidates although some did not gain the mark because they gave their answer in terms of not holding the maximum number of hydrogen atoms.

10 High scoring candidates found this quite straightforward and gained three marks. Only a small number gained three marks for 6300J. Common errors were the use of 2g or 102g instead of 100g but the majority of candidates were able to gain the mark for the temperature change.

11 (a) Well answered but common errors were to just put 'amount' and to put 1 degree without C or K.

(b) High scoring candidates usually gained the mark here although a few got the steel and aluminium the wrong way round. The majority of candidates did not identify the temperature change and gave answers referring to mass / density or the final temperatures.

(c) All the words were used and in most combinations. Some candidates did get both marks but the majority scored one, for foam and convection. Conduction was the most common error.

12 (a) Well answered although many gained both marks for 0.6 not 60.

(b) This was not well answered and those candidates who did gain both marks usually referred to reduced conduction and no or spaced out particles. There were vague references to energy but incorrect in terms of energy transfer. Convection was rarely qualified. Common errors were references to heat particles often travelling through the glass or the idea that particles were being trapped in the gap and unable to move.

13 (a) (i) Generally well answered by the majority.
(ii) Most candidates did realise that she could stay in the sun longer with Bronze Blush and often also gained the 150 minute marking point to gain 2 marks. Fewer candidates worked out that it was twice as long. Very few stated or knew that sun cream absorbs UV.

(b) Not well answered. There were very few references to UV, usually referring to the sun's rays, and even less to absorption, usually stating that the rays reflected off light skin. When candidates did try to use absorb it was usually in the wrong context ie light skin absorbs UV so it damages the skin, not distinguishing between the melanin layer and the tissue underneath. More able candidates tended to gain their mark for correct references to melanin. The most common error was to say that light skin is not used to the sun.

(c) There were very few candidates who actually understood this and were able to gain full marks **and** give a totally accurate answer. It was a good discriminator. It is a concern that so many candidates have such great misconceptions of this high profile issue. The majority of candidates did not know the difference between the damage to the ozone layer and global warming / the greenhouse effect.

- The ozone layer was given in most answers but candidates rarely knew it absorbed UV rather stating it blocked /reflected it or the sun's rays back / away from earth.
- The most common answer repeated the question stating that ozone layer was damaged or destroyed, not stating how. A number of candidates did correctly state that it formed holes or got thinner.
- CFCs were often seen but usually put together with carbon dioxide and / or greenhouse gases, all grouped together as one.

14 (a) Some candidates gained all three marks here with others scoring usually none or very occasionally one for conduction. The rest gave various combinations.
Outer / top/ surface were often seen.
Water was not well known and protein was a common error.
Kinetic energy was not known except by the highest scoring candidates. The most common answer was heat.
Conduction and convection were not seen together very often. The most common combination was conduction and radiation. Microwaves and infra red were used by those who did not understand the idea of energy transfer.

(b) Many candidates gained this mark as the mark scheme accepted wavelength, frequency, amplitude or intensity. A common error was to give a vague reference to size change.

B622/01 Foundation Tier

General Comments

This was the third occasion that this examination was available to be sat by candidates. There were approximately 9200 candidates and marks ranged from 0 to 55 out of 60. Nearly a third of the candidates achieved a grade C and there were a minority who might have been better targeted at higher tier.

The mean mark for the paper was 31.5 and the paper discriminated satisfactorily over the target grade range of G to C. The paper allowed candidates to demonstrate positive achievement in all three areas of science.

There was little evidence that candidates had insufficient time to complete the paper and there were few instances of questions being omitted. Some candidates did not follow instructions regarding how to answer questions or how many questions to answer. Where the intentions of the candidate were clear, marks were awarded, however on occasions it was not always clear whet the candidate meant so no marks could be scored.

Candidates re encouraged to show how they work out the answer to numerical questions. In this way, credit can be given for showing how an answer is obtained, even if the answer is incorrect. Where a unit is asked for in a calculation question, this mark usually stands as an independent mark. In science papers, unit refers to the physical quantity. A number of candidates interpret unit as in mathematics – hundreds, tens and units.

Some examiners stated that poor grammar or expression made marking difficult and in extreme cases will have cost marks.

Comments on Individual Questions

1 (a) Most candidates were able to identify one or two finite resources.
(b) The majority of candidates appreciated that there was an increase in either population or the existing population producing more waste.

2 (a) Most candidates correctly identified a characteristic of the crocodile that identified it as a predator.
(b) Almost half of the candidates could assign the crocodile to the two groups correctly. Few candidates failed to score.
(c) Fewer than half of the candidates knew that birds cleaned the mouth of the crocodile. A common misconception was that the crocodile allowed the bird to stay there to entice prey.

3 (a) This was well answered with almost every candidate recognising where the oldest fossils were found.
(b) Half of the candidates suggested why parts of the animal did not fossilise.
(c) Only the more able candidates were able to express themselves well enough to gain credit for describing how fossils formed.
(d) Few candidates were unable to explain the meaning of extinct. Those who did not do so, often confused extinct with endangered.

4 (a) This question discriminated well with marks being evenly distributed from 0 to 3. There was often a reversal of carbon dioxide and oxygen in the answers.
(b) Few candidates could explain why plants respire. A few stated that leaves absorb nutrients. A significant number did not attempt the question.

5 (a) Two thirds of candidates correctly identified the pit-fall trap as the method of catching beetles at night. Pooter was the most common distracter.
(b) The majority of candidates identified the ground beetle from the key. Stag beetle was a common distracter.
(c) There were few correct answers. Some candidates managed to score one mark from their working but that was all.

6 (a) This question was well answered. The most common error was to state that steel did not rust.
(b) A surprisingly high number of candidates did not know that oxygen was needed for iron to rust. Oil was a common answer.
(c) Most candidates could provide an advantage for recycling.

7 (a) The majority of candidates scored both marks.
(b) Earthquake was the most common answer. There were some answers explaining subduction.
(c) A significant number did not attempt the question. Few knew the correct answer and answers such as incontinental were common.

8 (a) Half the candidates were able to correctly write a word equation. Those who attempted a symbolic equation invariably failed to score.
(b) Almost every candidate was able to read from the graph correctly. Less than a third of the candidates could explain why the reaction stopped. The most common error was to state that there was “no more gas”. There was some evidence of candidates failing to read the question properly and answering in terms of the “zinc being used up”.
(c) There were few correct answers. Many candidates referred to “using a larger gas syringe”. Marks were awarded for writing about different ways of making the reaction speed up OR by describing how a particular method increased the rate of reaction.

9 (a) Most candidates scored the mark.
(b) Some answers were too vague to score the mark. Causing cancer was a common incorrect response.

10 (a) Electrolysis was not commonly known as the method of purifying copper. Half of the candidates identified copper sulfate solution as the liquid. Sulfuric acid was a common distracter. The name of the electrode was not well answered. Candidates appeared to guess this answer.
(b) Fewer than half the candidates identified brass as an alloy. Zinc was a common distracter.

11 (a) Most candidates knew at least one of the other types of nuclear radiation.
(b) Harmful effects of radiation are well understood.
(c) Candidates were able to describe a safety precaution taken by the teacher, although gas mask was a common answer and the influence of the world wide web was evident with the use of googles as eye protection!

12 (a) This was well answered by almost all.
(b) Most scored the mark for the current decreasing although some simply stated “zero” or just “low”.
(c) The majority were able to score at least one mark. A surprisingly high number failed to score the mark for the unit.

13 This part of the specification was poorly understood.

(a) A significant number did not attempt the first part of this question. A third of the candidates knew that a field was produced. Electricity was a common answer. Very few candidates appeared to have heard of a plotting compass or even a compass.

(b) A significant number did not attempt the first part of this question. Only half of the candidates knew that the ends of magnets were called poles. Many candidates appeared to know little about electromagnetic induction, suggesting the use of a bigger battery as a way of increasing the current.

14 (a) The majority of candidates knew that the Sun was at the centre of the Solar System.

(b) Only half knew the name of the fourth planet from the Sun and whilst most knew that asteroids were made from rock, many candidates included ice as part of their answer, confusing with comets.

(c) Many candidates thought the Moon was a Near-Earth Object but the majority scored the mark. Whilst most knew that a telescope would be used to observe a NEO, some suggested the use of a microscope whilst others stated satellite without further amplification.

B622/02 Higher Tier

General Comments

The paper was judged an appropriate level of difficulty. Candidates completed the paper and there was no evidence of lack of time.

A wide range of marks was seen.

Most candidates appeared to have been adequately prepared for the examination, which is of great credit to centres given the early examination date.

A number of candidates would have benefited by being entered for the foundation tier as they found it difficult to express answers clearly.

Comments on Individual Questions

1 (a) and (b) were generally well answered. Where marks were lost it was often due to candidates being unable to express their ideas clearly. Responses such as 'filled with rock' 'crawled away' were common.
(c) The majority gained marks however some were distracted with the exo/endo skeleton ideas.
(d) A good range of responses were seen. The idea of better technology was the main distracter and too vague to gain marks.

2 (a) Candidates lost marks by writing incorrect formulae. They should be encouraged to write words into a word equation.
(b) Few candidates understood that starch is insoluble and therefore remains inside the cell.
(c) Candidates found this difficult often looking for complicated answers involving photosynthesis instead of stating the need to release energy.

3 (a) Candidates should be encouraged to set their working out in a logical manner. If an incorrect value was given it became difficult to award marks for working out.
(b) This question was generally well answered.

4 (a) Very few candidates understood the role of bacteria in leguminous plants. Many made suggestions such as the Sun.
(b) A large number of candidates understood that the weeds did not have enough nitrates.
(c) This question was generally well answered.

5 (a) This question was generally well answered.
(b) More able candidates could express their ideas clearly and gained marks. The majority of candidates had difficulty in expressing a structure statement and a number filled the space by re-writing the stem. Many lost marks by not giving a qualified response such as 'They could not find a mate because they are spread out in large oceans.'
(c) Most candidates realised the oceans are too large to police. But some candidates described why people would continue to hunt not why it is difficult to stop them.

6 (a) (b) and (c) Generally well answered by majority of candidates.
(d) Many candidates referred to aluminium oxide but failure to identify the layer as ‘protective’ prevented many candidates from gaining the mark.

7 (a) Most candidates identified oceanic plates in part (i) they were also able to mention convection currents to gain the mark in part (ii).

(b) (i) Generally well answered by candidates. However some candidates thought that large crystals formed if the rock cooled quickly. In part (ii) most candidates incorrectly thought different rocks formed because of temperature or climate. Very few realised it was to do with mineral content.

8 (a) Generally well answered by the majority of candidates.

(b) Many candidates failed to use the correct terms. A significant number missed the surface area idea. The required response 'more frequent/more chance of collisions' was not common. Instead most candidates gained one mark for the simple idea of more collisions.

9 (a) Generally well answered by candidates.

(b) The majority of candidates gave the correct answer of poisonous not just harmful or dangerous.

(c) A large number of candidates managed to successfully write the formulae but could not balance the equation. Some candidates failed to achieve marks because of the careless writing of symbols. Cobalt (Co) symbol was common as was superscript notation.

10 (a) The incorrect answer of dilute sulfuric acid appeared as often as copper sulfate solution. In part (ii) more candidates seemed to think electrode B was the pure copper anode.

(b) Tin or aluminium appeared more often than the correct answer of zinc.

11 (a) Higher ability candidates scored well. A common fault was reference to heat energy or just light. Also candidates confused 'making energy' with 'energy transfer'. Weaker candidates tended to use the bullet points in any random order.

(b) The majority of candidates correctly calculated the answer but had no idea of the correct units.

12 (a) Very few candidates understood that moving electrons caused the magnetic field to be produced.

(b) Generally well answered by majority of candidates. The most common errors involved the idea of bigger magnets. Some candidates failed to describe how to make a bigger current and simply said change the number of coils instead of increase them.

13 (a) Generally well answered by the majority of candidates.

(b) Most candidates understood the force to be gravitational but did not know asteroids were left over from the formation of the solar system.

(c) Many candidates correctly linked speed with gravity pull. However some candidates lost marks by referring to 'planets'.

(d) Most candidates scored at least one mark. However judging by the numbers of crossing out candidates were mostly guessing part (i).
Parts (ii) and (iii) were poorly answered with few candidates answering the questions correctly.

Grade Thresholds

General Certificate of Secondary Education
Science B (Specification Code J640)
January 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B621/01	Raw	60	-	-	-	37	31	25	19	13	0
	UMS	69	-	-	-	60	50	40	30	20	0
B621/02	Raw	60	45	37	28	20	15	12	-	-	0
	UMS	100	90	80	70	60	50	40	-	-	0
B622/01	Raw	60	-	-	-	36	29	23	17	11	0
	UMS	69	-	-	-	60	50	40	30	20	0
B622/02	Raw	60	42	34	26	18	11	7	-	-	0
	UMS	100	90	80	70	60	50	40	-	-	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J640	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
	3.42	20.2	43.5	71.0	87.9	96.0	99.0	99.8	100.0	1581

1921 candidates were entered for aggregation this series

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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