

**Physics B J645**

**Gateway Science Suite**

General Certificate of Secondary Education

**Reports on the Units**

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**January 2010**

**J645/R/10J**

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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 specification 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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Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

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## B651/01 Foundation Tier

### General Comments

This was the seventh occasion that this examination was available to be sat by candidates. There were approximately 730 candidates and marks ranged from 2 to 56 out of 60. 47.9% of the candidates achieved grade C. The mean mark for the paper was 32.1 and the paper discriminated satisfactorily over the target grade range of G to C.

There was no evidence to suggest that candidates had insufficient time to complete the paper but there were a significant number of candidates who failed to attempt some parts of some questions. Candidates should be encouraged to show how they work out their answers to numerical questions. In this way, credit can be given for showing how an answer is obtained, even if the answer is incorrect. There was some evidence that candidates may not have read questions properly and in doing so provided very good scientific answers to questions that had not been asked.

### Comments on Individual Questions:

- Question No. 1 Half the candidates correctly listed two possible causes of global warming. Many candidates did not answer the question and wrote very good answers about the effects of global warming. Damage to the ozone layer was mentioned by a significant number. A proportion of candidates continue to be confused by the cause of sun tan: many believe it to be caused by infrared rather than ultraviolet radiation. The vast majority of candidates knew the effects of over exposure to the sun and could suggest how to reduce such effects.
- Question No. 2 Three quarters of candidates correctly identified air as an insulator that reduces energy loss by conduction. Most of the remainder either thought that air is a good conductor or that it reduces energy loss by conservation. The majority of candidates correctly listed two other ways of insulating the home, but only half could explain the meaning of payback time. There is a widespread belief that it is how long it takes to pay back the money borrowed to pay for the insulation.
- Question No. 3 Fewer than half the candidates could label the characteristics of a transverse wave. A half-wavelength was frequently labelled as the amplitude and there was confusion between crest and trough. The majority of candidates scored both marks for the calculation. Those who did not do so frequently scored one mark for showing their working.
- Question No. 4 The advantages of wireless technology are well known. Less than one in five candidates could write about the difference between analogue and digital signals. Some wrote about different speeds, others about clarity of signal. Only ten per cent of candidates could explain why interference happens. The fact that the frequency of the signals needs to be similar was not well understood.
- Question No. 5 Fewer than one in ten candidates could identify the Sun as the source of wind energy. The majority believe it comes from the sea or the air. A similar number could not suggest how to increase the output from a generator. Many suggested increasing the input voltage.
- Question No. 6 Nearly a quarter of candidates failed to answer part (a) of this question. Few could list batteries or cells as sources of DC. Some suggested solar cells

whilst there was evidence that candidates had not read the question properly and listed appliances that work on DC. The waste of energy from the power station is not well understood. Whilst many acknowledge the energy went into the environment, they did not explain that it was in the form of heat. Many wrote of recycling the energy.

- Question No. 7 Whilst the majority recognised from the data provided that kettle would cost the most in a set time, only a third realised that the cost depended on the product of power and time.
- Question No. 8 Only half the candidates knew why nuclear radiation is dangerous. Many wrote that it remained radioactive for a long time. A third of candidates omitted part (b) and could not list a use for plutonium. There were no common misconceptions but a wide range of uses listed. Having specified in the question that protective clothing is worn, and other safety precautions asked for, many candidates mentioned gloves, laboratory coats and pressure suits as additional safety precautions.
- Question No. 9 Fewer than half the candidates could name the two planets nearest the Sun in the correct order. All planets were seen as responses with Pluto, Mars and the Moon being common responses. Gravity is well known as the force keeping the planets in orbit with magnetic being a common erroneous answer. The sentence completion was well answered with most scoring at least two of the three marks. The most common errors were for the magnetic field to be measured with a protractor or the core of the Earth to contain molten lead.
- Question No. 10 The effect of an asteroid strike was not well known. Many wrote about the destruction of the ozone layer. The answers to part (b) were often not detailed enough to gain credit. Whilst acknowledging that unmanned spacecraft did not contain humans, candidates were expected to explain that humans need water and oxygen.
- Question No. 11 This question was well answered. The only common error was to state that a ruler would be used to measure a distance of several hundred metres.
- Question No. 12 The units of work and energy are not well known. Only one in ten candidates knew they have the same unit. There were no common misconceptions. The majority of candidates believe that speed is a measure of how quickly work is done.
- Question No. 13 This question was not well answered. Just under half the candidates identified the highest point as where gravitational potential energy is greatest. There is confusion about energy transfer when things are falling. Many believe the potential energy increases as the falling object speeds up. A quarter of candidates correctly discussed the energy change. The effect of water as a lubricant on the slide is reasonably well known but few candidates mentioned friction and gravity as the forces acting.
- Question No. 14 Whilst the majority of candidates correctly listed the fuels used by cars, coal, oil and plutonium were common answers. Two thirds of candidates correctly interpreted data on fuel consumption. The remainder gave the BMW 3 series confusing highest fuel consumption with best fuel consumption. Candidates appear not to have understood the meaning of litres per 100km.
- Question No. 15 Braking and stopping distance were common answers to part (a). The majority correctly interpreted the chart to obtain a value for braking distance but less than half of candidates added braking to thinking distance to obtain overall stopping distance; many just wrote the thinking distance.

## B651/02 Higher Tier

### General Comments

The standard of the candidate's answers was generally good and showed a broad understanding of the three Modules in Unit 1. The standard of work was equally good across the three Modules being tested. If anything there was a general impression from the Examiners that the work was of a higher standard than previously but this was not substantiated by the statistics. Whilst there were many areas of Modules P1, P2 and P3 where candidates displayed very good levels of knowledge and understanding there remains areas that are relatively weak and these need addressing by Centres

- the nature of the **scales** that temperature and energy are measured on
- insulation/reduction of heat loss through cavity walls
- the reason for interference of radio stations
- solar flares
- advantages and disadvantages of different energy sources
- photocells
- GPE in practical situations
- calculations involving change of subject.

However, although there are a lot of areas mentioned above they do not apply to all Centres or all candidates and should not detract from the high standard of work that many candidates presented.

There was no evidence for lack of time for the candidates to complete the examination paper nor did there appear to be any misunderstanding of the rubric. Candidates were generally entered for the correct Tier and had been well prepared by the Centres.

### Comments on questions

#### SECTION A

- 1 (a) Usually one mark was gained often for 'change of state' or describing the change (eg solid to liquid). Relatively few two mark answers for melting and boiling (just over  $\frac{1}{4}$  of the entry managed two marks). Answers that had missed the point of the question answered in terms of S.H.C.
- (b) Most candidates gained one mark for hotness and energy. The chosen and absolute nature of the scales was not well known or understood. Positive as the final part of the answer often spoilt three previous correct selections from the list.
- 2 (a) Answers were often framed around vibrations or heat without mention of **energy**. In other responses candidates who did answer in terms of energy often failed to link it to passing on from one particle to another.
- (b) Again, a low number of two mark answers, the mark gained usually was for the idea of 'trapped air' although some responses fell short of credit because they were about air moving into the cavity **then** becoming trapped in the foam. A lot of one mark answers failed to mention reduced convection or radiation.
- (c) Some well crafted answers to this question which was a change to previous papers where candidates were merely asked to calculate payback time. Poor answers referred to paying back the money, or loan for the cost of the foam injection without any mention of saving on fuel bills. This style of testing payback time was far more differentiating as some 30% failed to secure credit.

- (d) Again a relatively simple concept caught many candidates out. Regurgitating things such as 'curtains', 'draught proofing' or 'double glazing' failed to address **this** loss (radiated energy from the radiators going to the wall).
- 3 (a) Simpler calculations like this that involve no change of subject or extraction of data from a table or diagram tend to have a high success rate. This proved to be the case with >90% gaining both marks.
- (b) However, the second part of this question proved to more testing. Many candidates resorted to 'easier', 'quicker' or 'interference' and failed to register the mark.
- 4 (a) This was another easy start to a question, a very high success rate, similar to 3(a).
- (b) This was an overlap question with the Foundation Tier and caused a lot of problems for many candidates (only 40% gained both marks). The errors came when they described how interference affected the two types of signals, or the 'quality' of analogue vs. digital. Many candidates did not compare the features of the two types at all (just less than 33% of the entry failed to register any mark).
- (c) Roughly a 50/50 split between success and failure here. Zero scores came from a description of waves overlapping or, presumably influenced by part (b), answers in terms of analogue and digital signals. The latter was often an answer about analogue 'picking up' interference and it was difficult to remove it.
- 5 (a) Surprisingly this mark was gained by only half of the candidates; vague references to 'problems' or 'dangerous' without any reference to health or specific health problems being insufficient. A significant number of answers referred to the distractions and interference with pupils learning that it would cause the pupils or that pupils would have too strong a signal and be on the phone too often.
- (b) A question aimed at the higher grade candidates and very few were awarded both marks. Poor answers repeated the signal loss in the stem of the question whilst one mark answers for the signal being blocked were rarely followed up with a subsequent response that secured the second mark. Indeed many candidates wrote about the diffraction **causing** signal loss.
- (c) This was the total reverse of the previous part of question 5 in terms of the success rate with approximately 90% gaining the mark.

## SECTION B

- 6 (a) A bit of a mixed bag, around half gained full marks but one in five scored zero. The problem was that the question was intended to produce responses about the final end point of stars not intermediate steps along the way. Although the mark scheme addressed the problem candidates appeared disorganised with their answers.
- (b) A very low success rate, some candidates thought it related to (a) and chose from the list again. Other popular incorrect answers were; cosmic radiation, solar flares and explosions. Some unsuccessfully tried to describe the process.
- 7 (a) (i) Another overlap question which produced a much better crop of answers in question 7; particularly in the first part where 'causes cancer' was a frequent answer.
- (ii) Almost half failed to score here. Many wrote about weapons but in very vague terms. Other common non-scoring responses were nuclear fuel (given in the question), cleaning medical equipment and measuring radioactivity in rocks. All these answers relate to the thrust of the question but are not correct.

- (b) Responses that failed to secure the mark usually mentioned burial underground but failed to put **deeply**.
- 8 (a) (i) This question presented a huge challenge. Weak references to energy or explosions did not gain credit but more frequently candidates wrote about 'radiation' from the Sun or the effect on satellites (prompted by the next part of the question).
- (ii) A reasonable number of acceptable answers although far too many answers were about burning out circuitry in the satellite rather than the effect on signals or communications.
- (b) Most candidates gained the mark. Mars was the common error or, less frequently, Saturn for planet 2.
- (c) Gravity being the force in question was well recalled with centripetal being seen occasionally.
- 9 (a) A question that differentiated strongly. Although the number of acceptable answers covered a wide range two mark answers were infrequent and three marks were hardly ever awarded. Often responses were close but not complete e.g. coal; gives out pollution (no reference to carbon dioxide or sulfur dioxide); nuclear; 'produce waste' (no mention of radioactive); wood; produces little energy (no mention of needing lots of land or that wood is sustainable). Weak efforts included; 'cheap', 'a good source', 'provides plenty of heat' for advantages and 'no pollution', 'low energy release' as disadvantages.
- (b) A high level of mark gain, the zero scores having an advantage (lower cost to consumer) but no allowable disadvantage (usually answers here were about the risk of fires with unattended appliances).
- 10 (a) The failure in this question was to use the data to explain the change of **current**, potentially good answers using 'power' often underachieved. The subtle point of change in the rate of current fall as distance increased was not appreciated. Explaining the effect of light levels on the number of electrons released was rarely seen.
- (b) Quite amazing that roughly half of the entry failed to register any mark here. Many thought this followed on directly from (a) and answered in terms of photocells. Others, although on the right track vaguely gave; 'move it faster', use a bigger magnet' or 'put more current/voltage/power in/add a battery'.
- (c) Too many candidates failed to give both parts required for this mark (i.e. cycles/waves **and** a link to time). Poor answers were in terms of energy or current flowing, rewording of 'Hz' or description of a wave feature (e.g. wavelength).

## SECTION C

- 11 (a) A straightforward calculation that yielded a very large number of correct answers.  
(b)(i)&(ii) Both parts were successfully answered by most candidates. Approximately 90% gained full marks in the question as a whole.
- 12 An overlap question that produced maximum marks for a significant majority. The poorest part was (b) where reference to the car polluting (at point of use, manufacture or disposal: particularly the battery) or nuclear power stations failed to gain the award of that particular mark.



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- 13 (a)** This calculation produced a good level of differentiation. It tended to be 2 marks or zero, there being a 2/3rds split in favour of maximum marks.
- (b)** The good level of differentiation was continued in the second part of question 13, the better candidates appreciating that not only did Janine's G.P.E. fall but that it was transferred to kinetic energy.
- (c)** Most candidates gained one mark usually for the father having a bigger mass of weight / larger surface area or for more drag/friction. Only the very best connected the two ideas to gain full marks. Poor answers used 'heavier' and included explanations about the father being taller or bigger.
- 14 (a)** Only the most able candidates gained this mark. Unsuccessful answers were about moving in a circle, balanced forces, gravity pulling the car down or some became confused with speed being constant.
- (b)** Very similar to 13(a) in terms of it being a 0 or 2 mark award and the level of differentiation produced. Equations involving any degree of manipulation halt many candidates in their tracks.
- (c)** Another question that provided excellent differentiation. The less able candidates included the idea of 'cushioning' the force or impact, or they tried to describe the absorption of energy or simply reworded the reduction of force statement in the question.
- 15** All parts were successfully answered by the vast majority. The common errors for unsuccessful responses were
- 21m in (a)
  - 64m (75m – 21m) in (b)
  - no mention of braking or stopping distance (often 'longer' was given) or trying to explain in terms or **reduced** friction in (b).

## B652/01 Foundation Tier

### General Comments:

This was the fifth occasion that this examination was available to be sat by candidates. There were approximately 80 candidates and marks ranged from 0 to 46 out of 60. 52.9% of the candidates achieved grade C. The mean mark for the paper was 29.2 and the paper discriminated satisfactorily over the target grade range of G to C.

There was no evidence to suggest that candidates had insufficient time to complete the paper but there were a significant number of candidates who failed to attempt question 13 either in whole or in part. Candidates should be 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.

### Comments on Individual Questions:

- Question No. 1 Three quarters of candidates knew that dust would be attracted to a charged duster and could name the kinds of charge as positive and negative. Two thirds of candidates were able to complete sentences to show they understood how an electrostatic precipitator worked. The most common error was to state that the plates were neutral or charged so the dust falls down. Just over half could provide one example of how static electricity can be dangerous. There were no common misconceptions.
- Question No. 2 Less than a quarter of candidates correctly described what happens when a fuse blows. Most simply stated that the circuit would not work. Some explained why the fuse blows. The majority of candidates correctly calculated the resistance. Those who did not do so either multiplied the voltage and current or used an incorrect equation. A good number did score one mark for showing their working correctly.
- Question No. 3 Half the candidates could write about three uses of ultrasound in hospitals. Some confused ultrasound with X-rays. Others wrote about two or even three examples of scanning. Two thirds of candidates answered the true false statements correctly. A common error was the belief that radiation did not harm cells in the body. Very few candidates knew the term tracer – camera was the most common answer. Most knew that radioactivity decreases over time and two thirds could identify the nucleus as the origin of nuclear radiation. Centre or middle were not answers worthy of credit.
- Question No. 4 This was not well answered. Only a third of candidates knew that uranium (or plutonium) is the fuel used in a nuclear reactor. Coal and oil were common answers suggesting that candidates had not read the question properly. Only a quarter of candidates could write about how heat is used in a power station to produce steam.
- Question No. 5 The majority of candidates know that gravity keeps the Moon in orbit. Three quarters correctly listed two uses of artificial satellites. Surprisingly, fewer than one in five chose microwaves from a list of four answers about communicating with satellites. Ultraviolet was the most popular choice with radio and infrared also being suggested quite frequently.
- Question No. 6 Two thirds of candidates correctly identified the focal point, but only a quarter could then go on to identify the focal length. Many answers failed to use the position of the focal point. The effect of increasing the thickness of the lens is

*Reports on the Units taken in January 2010*

not understood – a third of candidates answered correctly from a choice of three answers. The uses of convex lenses are better known with two thirds of candidates correctly listing two.

- Question No. 7 Almost every candidate could select the vehicle that had the fastest speed but answers about relative speed often referred to the relative size of the vehicles rather than their relative directions.
- Question No. 8 Only half the candidates knew that an aerial or antenna is needed by a radio. Many simply wrote receiver and a fifth of candidates did not attempt this part of the question. The fact that long waves will spread out around buildings is not well understood. Many wrote about reflection from the atmosphere or satellites. Fewer than half of the candidates stated that waves are reflected from the upper atmosphere. There were no common misconceptions.
- Question No. 9 The majority of candidates correctly calculated the momentum of the bus, but only half knew that increasing the mass increased the momentum. Many wrote that the velocity would increase, a significant number thought the momentum would decrease. There appears to be confusion between mass and momentum. Only a fifth of candidates correctly calculated the final velocity but many scored one mark by showing their working and/or arriving at the increase in velocity.
- Question No. 10 The majority of candidates knew the correct units. Few could explain how the graph could be used to find the resistance of the wire. Many simply wrote voltage/current without explaining how the graph should be used to find the **corresponding** values.
- Question No. 11 Whilst the majority of candidates knew that a thermistor responds to changes in temperature, only a half knew that a LDR responds to light. The symbols for a capacitor and a diode are not well known with only ten per cent of candidates correctly identified both. Common errors were battery or cell for the capacitor and a very varied selection of answers for the diode.
- Question No. 12 Only half the candidates could identify the appliances containing motors. The fact that 4 was a common answer means that many believe either a kettle or table lamp contains a motor. The effect of increasing the speed of rotation and strength of a magnet in a dynamo is not well understood. Few candidates scored these marks.
- Question No. 13 This question was not well answered. Only one in twenty recognised that there would not be an output from a transformer connected to a DC supply. A third of candidates did not attempt part b with a further third correctly identifying the transformer as a step-down, but few could suggest a use for such a transformer. The calculation proved to be more demanding than others on the paper with a third not attempting it and a quarter scoring both marks. A significant number of candidates tried to use other equations from those supplied.
- Question No. 14 Nearly two thirds of candidates knew the truth table for a NOT gate. The use of a latch is not understood with only one or two candidates scoring the marks. Most correctly identified the output from the combination of logic gates.

## B652/02 Higher Tier

### General Comments:

This was the fifth occasion that this examination was available to be sat by candidates. There were approximately 540 candidates and marks ranged from 13 to 58 out of 60. 44.1% of the candidates achieved grades A or A\*.

The mean mark for the paper was 32 and the paper discriminated satisfactorily over the target grade range of A\* to C.

There was no evidence to suggest that candidates had insufficient time to complete the paper and there were only a couple of instances where a significant number of candidates failed to attempt parts of questions. In general, candidates were able to follow instructions regarding how to answer questions or how many answers to provide.

Candidates should be 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.

### Comments on Individual Questions:

- Question No. 1 The majority of candidates scored full marks. The marking point most commonly missed was the idea of electron transfer from the plastic bag to the duster. Many candidates could complete the sentences to describe how an electrostatic precipitator works. The suggestion that the plates are neutral so the dust falls down was a common misconception.
- Question No. 2 Two thirds of candidates correctly described what happens when a fuse blows. Those who failed to score either simply stated that the circuit would now work or explained why the fuse blows. Almost every candidate correctly used the equation provided to calculate the resistance. Those who did not score marks multiplied the current and voltage.
- Question No. 3 The majority of candidates scored full marks. Those who scored only two marks omitted the idea of the kidney stone vibrating. Half the candidates scored both marks for their explanation of how gamma radiation is used to treat a tumour. One mark was usually scored by the remaining candidates who provided the same answer twice by concentrating on the idea of targeting the tumour and not mentioning the idea of limiting exposure of healthy tissue.
- Question No. 4 Only half the candidates correctly completed the flow diagram explaining a chain reaction. Atom was frequently mentioned instead of nucleus. The term neutron was more widely known than in the past. Only a third of candidates knew that control rods absorbed excess neutrons. Most described their role as slowing down or stopping the neutrons. Almost every candidate correctly named the fission process.
- Question No. 5 There was a lack of precision in the answer to part (a). Most candidates correctly commented on the penetrating power but stopped short of stating that gamma radiation is the only one that would be detected at the surface. Part (b) was answered more accurately and two thirds of candidates gave good explanations. Those who failed to score provided vague answers about detecting radiation.
- Question No. 6 Almost every candidate correctly calculated the momentum of the bus and most knew that increasing the mass increased the momentum. Some wrote that the velocity would increase. There appears to be some confusion

between mass and momentum. Three quarters of candidates correctly calculated the final velocity but the remainder usually scored one mark by showing their working and/or arriving at the increase in velocity. Fewer than half the candidates scored full marks for explaining why the skaters moved at different speeds. The question discriminated well at grade A and grade C candidates revealed many misconceptions. The heavier skater moves faster and the heavier skater exerts more force were both common errors.

- Question No. 7 Most of the candidates correctly identified the force that keeps the Moon in orbit. Those who did not score the mark usually answered as centrifugal. Many candidates could identify the special features of a geostationary satellite but there was some lack of clarity in answers. The idea that the satellite is in orbit **above** the equator was often not clear. In parts (b)(ii) and (c), many candidates wrote about the uses of the satellites instead of answering the specific question. Only half the candidates knew that microwaves are used for satellite transmission. Both radio and infrared were common answers.
- Question No. 8 This question was deliberately challenging, targeting the more able candidates. Some marks were scored for the idea of vertical light passing through the glasses. The fact that the reflected light is horizontally polarised was rarely mentioned. Many candidates wrote that the light from the snow was reflected back from the glasses.
- Question No. 9 Just over half the candidates could describe diffraction. Some wrote about reflection from the ionosphere which was credited. Few could explain why microwaves travel in narrow beams. Those who scored marks, usually had the idea of less diffraction.
- Question No. 10 Fewer than half the candidates could explain how the graph could be used to find the resistance of the wire. Many simply wrote voltage/current without explaining how the graph should be used to find the **corresponding** values. Some mentioned the gradient of the line for one mark but few the inverse of the gradient for both marks. Nearly twenty per cent of candidates did not attempt the diagram of a potential divider. Many of those who drew a diagram with two resistors in series failed to identify clearly **both** input terminals and **both** output terminals.
- Question No. 11 This question was not well answered. Candidates who wrote 'move the magnet away from the coil' scored the mark, but others simply stated turn the magnet around or move it to the other side without stating the direction in which the magnet should move. Whilst two thirds of candidates knew the effect of increasing the speed of rotation, few realised that by increasing the strength of the magnet, the frequency stayed the same.
- Question No. 12 The transformer calculation was not well answered. A common error was to add the turns and voltages. Part (b) was intentionally challenging. Nearly twenty per cent of candidates did not attempt the question and only one in ten scored full marks. There is general confusion about electromagnetic induction and the idea that a changing current is needed to produce a changing field to induce a changing current.
- Question No. 13 Only a third of candidates could correctly apply Flemings Left Hand Rule and a similar number identified the split ring commutator as the part of the motor keeping the force in the same direction. Slip rings and coil were common answers.

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Question No. 14 In general most of this question was well answered. Candidates could not explain the reason for a relay clearly. Many scored one mark for the idea of isolating the two circuits but could not explain why they were isolated. Few could explain the reason for the variable resistor. Most thought it controlled the speed of the fan.

# Grade Thresholds

General Certificate of Secondary Education  
Physics B (J645)  
January 2010 Examination Series

## Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B651/01	Raw	60	-	-	-	33	27	22	17	12	0
	UMS	69	-	-	-	60	50	40	30	20	0
B651/02	Raw	60	43	36	29	22	16	13	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B652/01	Raw	60	-	-	-	31	26	21	16	11	0
	UMS	69	-	-	-	60	50	40	30	20	0
B652/02	Raw	60	40	34	27	21	15	12	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	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
<b>J645</b>	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
<b>J645</b>	6.3	6.3	31.3	56.3	100.0	100.0	100.0	100.0	100.0	16

For a description of how UMS marks are calculated see:

<http://www.ocr.org.uk/learners/ums/index.html>

Statistics are correct at the time of publication.

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
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Facsimile: 01223 552627

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