



Mark Scheme (Results)

June 2016

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 1: Principles of Science (20460E)

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk for our BTEC qualifications.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson.

Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service.

Pearson: helping people progress, everywhere

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

January 2016

Publications Code 20460W_MS

All the material in this publication is copyright

© Pearson Education Ltd 2016

Question Number	Correct Answer	Additional Guidance	Mark
1 (a)	chemical/ potential		1
1 (b)(i)	thermal	allow heat allow infra-red/IR	1
1 (b)(ii)	sound/light	reject thermal/heat – unqualified allow thermal/heat lost to surroundings	1
1 (c)	more trees can be {grown/planted}	allow wood can be replaced ignore they won't run out reject 'can be reused'	1

2 (a)	i- red (1) ii- violet (1)	allow purple	2
2 (b)(i)	Second mark is dependent on the first. (in wave A) more {waves/wavelengths /peaks/troughs} ORA (1) per (1/100 th) second (1)	allow the waves/peaks/wavelengths are closer together (1) allow other time scales /per unit time allow 'in the same amount of time'	2
2(b)(ii)	2 (m) (2) OR $\frac{800}{400}$ (2) OR $800 = (\text{wavelength}) \times 400$ (1)		2

	<p>OR</p> <p>wavelength = $\frac{\text{wave speed}}{\text{frequency}}$</p> <p>(1)</p>		
--	--	--	--

3 (a) (i)	<p>input – electrical (1)</p> <p>useful – thermal/kinetic (1)</p>	<p>allow electric ignore electricity</p> <p>allow heat allow light</p>	2
3 (a) (ii)	<p>1500 (W) (2)</p> <p>OR</p> <p>$\frac{180\,000}{120}$ (2)</p> <p>OR</p> <p>Power = $\frac{180\,000}{2}$ (2)</p> <p>OR</p> <p>2 x 60 (1)</p>	<p>allow 1.5 kW for 2 marks</p> <p>$\frac{180\,000}{(2 \times 60)}$</p> <p>90 000</p> <p>120</p>	2

<p>3(b)</p>	<p>4 marks – at least 1 from the conduction list.</p> <p>conduction</p> <p>(thermal) energy is transferred {through the <u>metal</u>/from the inside to the outside of the <u>radiator</u>} (1)</p> <p>from high temperature to low temperature (1)</p> <p>convection</p> <p>air warmed by the radiator (1)</p> <p>air expands/becomes less dense (1)</p> <p>air rises (into the room) (1)</p> <p>cooler air moves into its place (1)</p> <p>producing a convection current (1)</p>	<p>allow heat energy for thermal energy</p> <p>allow because of the temp. difference.</p> <p>ignore room warmed by radiator</p> <p>ignore heat rises</p> <p>If no other marks are scored, allow 1 mark max for 'hot water heats the metal'</p>	<p>4</p>
--------------------	--	--	----------

<p>4 (a)(i)</p>	<p>iodine</p>	<p>allow I/I₂ reject i/i₂/I₂/I²/i₂ reject iodide</p>	<p>1</p>
<p>4 (a)(ii)</p>	<p>silicon</p>	<p>allow Si reject si reject sI reject SI</p>	<p>1</p>
<p>4 (b)</p>	<p>five/5</p>	<p>reject group 5</p>	<p>1</p>

4 (c)(i)	O ₂	Reject O ² /O2/o2/o ²	1
4 (c)(ii)	Two or more <u>atoms</u> (1) chemically combined (1)	allow combined/held together/joined	2

5 (a)(i)	universal (indicator)	reject litmus	1
5 (a)(ii)	any value between 2 < 7		1
5 (b)	Second mark is dependent on first. Test - (bubble through) limewater (1) Result - (limewater) goes cloudy/white precipitate/milky (1)	Limewater goes cloudy = 2 marks	2

5 (c)	<p>12.01 (2)</p> <p>OR</p> $\frac{(12 \times 99) + (1 \times 13)}{100} \quad (2)$ <p>OR</p> $(12 \times 99) + (1 \times 13) \quad (1)$ <p>OR</p> $\frac{(12 \times 99)}{100} \quad (1)$ <p>OR</p> $\frac{(1 \times 13)}{100} \quad (1)$	<p>1201</p> <p>11.8</p> <p>0.13</p>	2
--------------	---	-------------------------------------	---

6	<p>Six from the following</p> <p>All produce a salt (1) All produce chlorides (1) All produce a soluble substance (1)</p> <p>Zinc and sodium carbonate produce a gas (1) (whence) copper oxide does not produce a gas (1)</p> <p>Copper oxide and sodium carbonate produce water (1) (whence) zinc does not produce water (1)</p> <p>Zinc produces hydrogen (1) (whence) sodium carbonate produces carbon dioxide (1)</p> <p>copper chloride solution is green/blue (1) (whence) zinc chloride and sodium chloride give colourless solutions (1)</p>	
	Total	6

7(a)	A – nucleus (1) B – cytoplasm (1) C – (cell) membrane (1)	Reject nuclear/neutron reject cell wall	3
7 (b)	(the site of) respiration/energy release/make lots of ATP	energy released from glucose/food allow produce energy ignore stores DNA	1

8(a)(i)	provides anchorage for the plant/uptake of {water/mineral salts} (1)	allow absorb water/nutrients/minerals allow take in/take up/soak up allow moisture instead of water ignore provides water/nutrients/minerals ignore food	1
8(a)(ii)	carries sugars (1)	accept any named sugar ignore carries/provides food	1
8(b)(i)	tissue(s) (1)		1
8(b)(ii)	circulatory /cardiovascular (1)		1

<p>8(c)</p>	<p>any four from</p> <p>endocrine system (sends messages) slower than nervous system ORA (1)</p> <p>endocrine (sends messages via) hormones (1)</p> <p>endocrine (sends messages via) the blood stream (1)</p> <p>nervous system (sends messages via) electrical signals (1)</p> <p>nervous system (sends messages via) neurones/nerves (1)</p> <p>nervous system uses chemical transmission across synapses (1)</p>	<p>allow nervous system is fast ORA</p> <p>allow a named hormone</p>	<p>4</p>
--------------------	---	--	----------

Question Number	Indicative Content	
9	<ul style="list-style-type: none"> • his body uses homeostasis • maintain a constant temperature • he sweats • the sweat absorbs heat from the skin/blood • heat from the body is used to evaporate the water/sweat • his blood vessels dilate/vasodilation • more blood passes through capillaries near to the surface of the skin • heat energy can be lost from the blood to surface of the skin • hairs lie down/remain flat • no layer of insulating air is trapped • sweat evaporates more readily. <p>ignore blood vessels move to the surface of the skin.</p>	
Level	Mark	Descriptor
	0	No rewardable material
Pass	1-2	Learners show some understanding of homeostasis and that Malik needs to cool down or they are able to simply describe how the body cools down when it is too hot. The answer is likely to be in the form of a list. Points made will be superficial/generic and not applied/ directly linked to the situation in question.
Merit	3-4	Learners show some understanding of homeostasis and that Malik needs to cool down and they are able to simply explain how the body cools down when it is too hot. Some points described, or a few key points explained. Most points made will be relevant to the situation in question, but the link will not always be clear.
Distinction	5-6	Learners show some understanding of homeostasis and that Malik needs to cool down and they are able to explain in detail how the body cools down when it is too hot. The answer is fully justified. A detailed discussion of each process. The majority of points made will be relevant and there will be some clear link to the situation in question.
		Total 6

For more information on Edexcel qualifications, please visit our website
www.edexcel.com

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual
.....



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

