



Mark Scheme

March 2018

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 8: Application of Science (20474E)

BTEC Qualifications from Pearson

BTEC qualifications 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.btec.co.uk for our BTEC qualifications.

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

March 2018

Publications Code xxxxxxxx*

All the material in this publication is copyright

© Pearson Education Ltd 2018

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- All marks on the mark scheme should be used appropriately.
- All marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if a candidate's response is not worthy of credit according to the mark scheme.
- Where some judgment is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt about applying the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Phonetic spelling should be accepted.

BTEC Next Generation Mark Scheme Template

Item	Expected answers	Additional guidance	Marks
1 (a)(i)	measuring cylinder/ pipette/ burette/{measuring/graduated} beaker	ignore 'beaker' /'cup' /'jug'/'tube'	1
1 (a)(ii)	temperature	allow '(to measure) how hot' ignore '(to measure) heat'	1
1 (b)	reduce (thermal) energy/heat loss	ORA allow so none of the heat leaves the cup allow trap all the heat inside the cup allow prevent heat escaping	1
1 (c)(i)	(chemical) burns	allow damage/corrode ignore harmful allow 'it irritates the skin' ignore it is an irritant without qualification	1
1 (c)(ii)	wear gloves/safety glasses (1) to{protect/ stop contact with} the skin/eyes (1)	link between precaution and reduction in risk must be relevant	2
Total mark			6

Item	Expected answers	Additional guidance	Marks
2 (a)	{change/difference/increase/rise}in heart rate	ignore 'heart rate alone'	1
2 (b)	<p>any 3 from {measure heart rate/take pulse} before the start of the exercise (1)</p> <p>{measure heart rate/take pulse} at the end of the exercise (1)</p> <p>calculate the {change/increase/difference} in heart rate (1)</p> <p>a range of at least three students (1)</p> <p>AND</p> <p>any 3 from use the same bike (1)</p> <p>do the exercise for a given time (1)</p> <p>keep the speed the same for each student /make sure each student pedals at a steady speed (1)</p> <p>keep the same resistance setting on the cycle (1)</p>	<p>allow 'record' for 'measure'</p> <p>allow {measure/record} {increase/change/difference} in heart rate</p> <p>allow a specified number of students</p> <p>allow a stated time</p> <p>ignore references to blood pressure</p>	6
Total mark			7

Item	Expected answers	Additional guidance	Marks
4 (a)	<p>Graph axes(2) correct y-axis labelled including unit - percentage / % (1).</p> <p>bars correctly labelled (1).</p> <p>scaling (2) correct numbers on y-axis (1).</p> <p>scale appropriate for y axis (1).</p> <p>plotting (2) all 6 bars drawn correctly (2) or 4 or 5 bars drawn correctly (1).</p>	<p>accept horizontal bars, i.e. axes reversed</p> <p>if numbers on the y- axis are directly taken from the table and evenly spaced, e.g. 13.2,14.5,16.0</p> <p>allow a max of up to 2 marks for axes only</p> <p>accept bars/columns drawn touching</p> <p>max 1 plotting mark for scatter/line graph.</p> <p>allow +/- one small square</p>	6

Item	Expected answers	Additional guidance	Marks
4 (b)	<p>Any three from</p> <p>% of men and women smoking decreases (1)</p> <p>(% of men and women smoking decreases) more in {2012/after the smoking ban/2008} compared to 2004 (1)</p> <p>{more/higher % of} men (than women) smoking (1)</p> <p>the difference in percentage between men and women smoking has become less (1)</p> <p>between 2004 and 2008 both men and women smoking rates dropped by {50%/half} (1)</p> <p>there are no data for period between 2004-2008 so it is difficult to see exactly the effect of the ban (1)</p>	<p>needs a comparison for each point</p> <p>ORA</p> <p>ORA</p>	3
Total mark			9

Item	Expected answers	Additional guidance	Marks
5ai	repeat the reading /ignore the result (1)		1
5(a)ii	<p>any two linked pairs from</p> <p>bung was not inserted into the flask fast enough/making the connection to the delivery tube (1)</p> <p>{carbon dioxide/gas} was lost (1)</p> <p>OR</p> <p>(gas) volume was read to early/reaction was left for a shorter time than the others (1)</p> <p>reaction had not finished (1)</p> <p>OR</p> <p>{lower/20%} concentration of glucose used (1)</p> <p>less {carbon dioxide/ gas} produced (1)</p> <p>OR</p> <p>{less/smaller amount} yeast used (1)</p> <p>so, less {carbon dioxide/gas} produced (1)</p>	allow leak from bung/seal around the delivery tube	4
5 (b)	<p>2.3 (2)</p> <p><u>OR</u></p> <p>$\frac{2.0 + 2.4 + 2.6}{3}$ (2)</p> <p>OR</p> <p><u>7.0</u> (2)</p> <p>3</p> <p>OR</p> <p>2.0 + 2.4 + 2.6 (1)</p> <p>OR</p> <p>a number divided by 3 (1)</p>	<p>accept 2.33</p> <p>7.0</p>	2
5 (c) (i)	5 (cm ³)	allow values between 4.8 and 5.2	1

5 (c) (ii)	<p>the greater the concentration in sucrose solution the more carbon dioxide is produced (1)</p> <p>the amount of carbon dioxide produced is proportional to the sucrose solution (concentration) <u>up to 30%</u> (1)</p> <p>when the sucrose solution reaches 50% the amount of carbon dioxide stays the same (1)</p> <p>OR</p> <p>the amount of carbon dioxide {is a maximum/stays the same} at 8 cm³ (1)</p>	<p>accept (up to 50%) there is a (low) positive correlation</p> <p>accept description of proportionality</p> <p>allow levels off/plateaus</p> <p>allow any number for start of levelling between 48 and 50%</p> <p>ORA for each statement</p>	3
Total mark			11

Item	Expected answers	Additional guidance	Marks
6 (a)	any line from prism to screen in between the red and violet rays (1)		1
6 (b)	<p>any three from:</p> <p>the percentage of light leaving is {greater/bigger /higher/more} at {longer /bigger/greater/higher} wavelengths (1)</p> <p>the graph {levels/levelling off} after 560nm (1)</p> <p>the line is {not straight/is curved} (1)</p> <p>the line is not proportional (1)</p> <p>bigger change (in percentage leaving optical fibre) for low wavelengths/ORA (1)</p>	<p>ignore comments supporting/not supporting the conclusion</p> <p>ORA</p> <p>allow 550 – 575</p>	3
Total Mark			4

Item	Indicative Content	Marks
7	<p>draw a line on the paper to show the position of the mirror. so that the {same/ reference line} for the protractor/normal is used/ the mirror can be in the same place (when the ray box is moved).</p> <p>always shine the ray of light to the same point on the mirror so that if there are any chips/cracks in the mirror these will not alter the readings.</p> <p>draw a normal/a line at right angles to the mirror at the point where the ray from the light source hits the mirror and mark its position so that the correct angles can be measured accurately.</p> <p>use a ruler to draw the path of the rays so that the rays are drawn {accurately/straight}</p> <p>measure the angle of incidence and reflection so that you can see the relationship</p> <p>draw the path of the light rays on the paper to measure the angles more accurately.</p> <p>use a protractor to measure the angles (of incidence/reflection/normal) so that the angles can be measured accurately/correctly.</p> <p>place the centre of the protractor at the point where the normal hits the mirror so that the angle measured is correct.</p> <p>use a narrow beam of light so that has the angle is measured accurately.</p> <p>keep the mirror vertical so that the normal and the light rays are all in the same plane.</p> <p>repeat the experiment for different angles of incidence to give more evidence for a bigger range of angles/make a comparison.</p> <p>use {low light levels /darkened room} to enable the light to be more easily seen</p>	6 expert

Level	0	No rewardable material.
Pass	1-2	<p>Identifies an appropriate improvement and explains it or simply states two improvements.</p> <p>E.g. mark the position of the mirror so it can always be placed in the same position</p> <p>OR</p> <p>Mark the position of the mirror and draw a normal to the mirror</p>
Merit	3-4	<p>Identifies appropriate improvements and explains them.</p> <p>E.g. mark the position of the mirror so it can always be placed in the same position</p> <p>AND</p> <p>use a protractor to measure the angles of incidence and reflection so that the angles can be measured accurately.</p> <p>OR</p> <p>repeat the experiment for different angles of incidence to give more evidence.</p> <p>AND</p> <p>use a narrow beam of light</p>
Distinction	5-6	<p>Identifies a range of improvements and explains them.</p> <p>E.g. mark the position of the mirror so it can always be placed in the same position</p> <p>AND</p> <p>use a protractor to measure the angles of incidence and reflection so that the angles can be measured accurately.</p> <p>AND</p> <p>place the centre of the protractor at the point the normal hits the mirror to ensure that the angle measured is correct.</p>
		Total Mark 6

Ofqual



Llywodraeth Cynulliad Cymru
Welsh Assembly Government



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