



Mark Scheme (Results)

January 2020

Pearson BTEC Level 3 National
Extended Certificate – Applied Human
Biology

Unit 3: Human Biology and Health
Issues

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Unit 3: Human Biology and Health Issues – sample marking grid

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks if a learner's response is not rewardable, according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

- The marking grids have been designed to assess learner work holistically.
- Rows within the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.
- Examiners should first make a holistic judgement on which band most closely matches the learner response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

Activity 1: Discuss how the article uses scientific information to present the pre-implantation genetic diagnosis (PGD) issue.

(12 marks)

Indicative content

Learners:

- **may include other valid suggestions, not listed below, which should be credited.**
- **may cover a number of examples from the list below.**
- **would NOT be expected to cover all points to get full marks.**

Interpretation and Analysis

- article states that PGD reduces risk of genetic disease
- no mention of percentage of births suffering from genetic disease
- no mention of potential to damage embryo during removal of cells for screening/testing
- Figure 1 explains the process of PGD clearly
- article states PGD increases chance of live birth from IVF but provides no evidence
- Figure 2 clearly demonstrates link between age and risk of fetus developing genetic disease
- article provides no evidence to support results of PGD
- controversial elements of PGD, such as destroying unused embryos, discussed using scientific sources
- Figure 2 does not use the data or trends to fully support the argument e.g. % of damaged embryos more than doubles from age 32 to 42
- Figure 3 is hard to follow and only shows that the overall number of referrals is relatively small
- Figure 3 not up to date
- Mixing the use of different numerical data when quoting from source 9 and 10 may make the interpretation of the data difficult

Validity and Reliability

- controversial elements highly dependent on public opinion, which can be influenced by newspapers and religious organisations
- private medical groups rely on 'selling' PGD to parents so may have incentive to overstate risks of not undergoing PGD
- opinion of religious organisations less likely to be based on science
- newspapers likely to focus on and feed controversy to sell more papers
- actual scientific process of PGD provided by qualified doctor, likely to be reliable
- HFEA is a government organisation so possibly influenced by politics, which in turn can be based on public opinion
- NHS data likely to be highly reliable as not-for-profit
- John Hopkins University is highly prestigious medical school and very reliable
- however figure 4 does not provide the number of people surveyed, age group, location
- article states that PGD reduces risk of genetic disease but does not support this with evidence
- survey almost 20 years old – opinions may be different now
- no discussion of bias for sources 3, 4, 8
- data for fig 4 is not qualified (sample size, type of population etc) and is public opinion
- source 10 is used only to represent one side of the argument with no counterargument given for the religious objections

Assessment focus	Band 0	Band 1	Band 2	Band 3	Band 4
	0	1–3	4–6	7–9	10–12
Interpretation, analysis and evaluation of scientific information.	Level of response not worthy of credit.	Generalised comments about how the health issue is presented, with limited attempt to consider any of the following: <ul style="list-style-type: none"> • how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made • the validity and reliability of data. 	The presentation of the health issue is discussed, partially supported by a consideration of some of the following: <ul style="list-style-type: none"> • how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made • the validity and reliability of data. 	The presentation of the health issue is discussed, mostly supported by a consideration of: <ul style="list-style-type: none"> • how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made • the validity and reliability of data. 	The presentation of the health issue is discussed, consistently supported throughout by the consideration of: <ul style="list-style-type: none"> • how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made • the validity and reliability of data.
		Limited discussion that contains generic assertions rather than considering different aspects.	Displays a partially developed discussion that considers some different aspects.	Displays a developed discussion that considers different aspects.	Displays a well-developed and logical discussion that clearly considers a wide range of different aspects.

Activity 2: Discuss the key factors affecting the pre-implantation genetic diagnosis (PGD) issue. (16 marks)

Learners:

- **may include other valid suggestions, not listed below, which should be credited.**
- **may cover a number of examples from the list below.**
- **would NOT be expected to cover all points to get full marks.**

Indicative content

Key Factors

- chance of fetus developing genetic disease based on family genetics
- relatively recent medical technique
- high cost
- requires highly trained physicians and specialised equipment
- long and complex process
- stressful for mother (and father)
- highly regulated with many conditions for prospective patients
- error rate of the technique which was not included in the article
- side effects of technique not included
- many ethical factors including
 - dangers of potential for eugenics
 - the discarding of embryos not used - religious objections
 - counter arguments – e.g. natural wastage of embryos
 - interfering with nature
 - counter arguments re naturalistic fallacy/all the other things humans do that interfere with nature
 - the creation of a 'saviour sibling'
- many social factors including
 - the potential for wealthy couples to produce healthier offspring
 - the potential for wealthy couples to produce more attractive, intelligent offspring
 - potential for some parents to choose an embryo with a disability e.g. deaf baby for deaf parents
 - the denigration of those living with genetic diseases

- the denigration of those living with socially unfavourable genetic mutations
- who decides which genetic factors are 'desirable' or 'undesirable'?
- the potential for racial or sex selection due to prejudice to inform PGD decisions. Although illegal, in some countries female embryos are selected against; however there have been illegal abortions of female fetuses and abandonment/murder of female babies in some countries already
- public opinion, which can be strongly influenced by the media
- pressure on parents to use PGD to provide best possible life for their child

Reference to article

- reference to statistics from the article
- uses data from figures
- summarises pros and cons of PGD using quotations
- uses key terms that are explained in the glossary

Assessment focus	Band 0	Band 1	Band 2	Band 3	Band 4
	0	1-4	5-8	9-12	13-16
Understanding the key factors that affect the health issue	Level of response not worthy of credit.	Demonstrates limited knowledge and understanding of the key factors affecting the health issue with generalised comments made.	Demonstrates adequate knowledge and understanding of the key factors affecting the health issue.	Demonstrates good knowledge and understanding of the key factors affecting the health issue.	Demonstrates comprehensive knowledge and understanding of the key factors affecting the health issue.
		Limited or no reference made to the article.	Attempts to use the article through the selection of some relevant aspects to support answer.	Sustained and logical connections made to the article through the selection of relevant aspects to support answer.	Sustained and comprehensive links made to the article through the selection of a wide range of relevant aspects to support answer.
		Limited discussion that contains generic assertions rather than considering different aspects.	Displays a partially developed discussion that considers some different aspects.	Displays a developed discussion that considers different aspects.	Displays a well-developed and logical discussion that clearly considers a wide range of different aspects.

Activity 3: Explain how different organisations/individuals influence the pre-implantation genetic diagnosis (PGD) issue. (10 marks)

Learners:

- **may include other valid suggestions, not listed below, which should be credited.**
- **may cover a number of examples from the list below.**
- **would NOT be expected to cover all points to get full marks.**

Indicative content

Organisation	Influence of scientific issue
NHS	Funding Prescribing and carrying out PGD Setting conditions for prescription Monitoring cases carry out clinical trials which are used by government agencies and the media
HFEA	Provides information to general public offer a broad and balanced view based on: links with independent organisations for peer review and independent research liaison / connections with charities which proved data on public opinion and personal stories champion some public campaigns Regulates fertility treatment and research Licensing body to carry out PGD

Private medical providers (Fertilite)	<p>Carrying out PGD</p> <p>Providing information to potential patients</p> <p>Gain financially from PGD - likely to highlight benefits rather than limitations</p>
Journal of the American Medical Association	<p>Scientific journal</p> <p>Publish research</p> <p>Provides opinion</p>
Daily Telegraph	<p>Newspaper, general public</p> <p>Caters to a conservative viewpoint</p> <p>Informing public regarding developments and controversy surrounding PGD</p>
Religious organisations	<p>Provides faith-based moral guidelines to members</p> <p>Political lobbyists</p> <p>Influence government decisions</p>
Johns Hopkins University	<p>Educational institute</p> <p>Funding studies</p> <p>Carrying out and publishing research</p>
Genetic Disorders UK	<p>Charity</p> <p>Funding research</p> <p>Supporting people with genetic diseases</p> <p>Raise understanding of genetic diseases</p>

Human Reproduction	<p>Scientific journal</p> <p>Publishes research</p> <p>Provides opinion</p>
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Individuals	Influence of scientific issue
Parents/patients	<p>Influenced by newspapers and could spread concern over PGD</p> <p>Could reduce number of women entering studies as not willing to proceed with PGD</p>
Dr John Zhang	<p>Has a PhD, qualified academic</p> <p>Internet blog</p> <p>Describes science behind PGD</p>
JA Robertson	<p>Author of "Extending preimplantation genetic diagnosis: the ethical debate. Ethical issues in new uses of preimplantation genetic diagnosis"</p> <p>Warns against the dangers of eugenics</p>
Hens K, Dondorp W, Handyside AH, Harper J, Newson AJ, Pennings G, Rehmann-Sutter C, de Wert G	<p>Authors of "Dynamics and ethics of comprehensive preimplantation genetic testing: a review of the challenges"</p> <p>Raise concerns over the potential applications of PGD</p>
Andrew Hough	<p>Journalist, Daily Telegraph</p> <p>Raises moral questions about PGD</p>

Sozos J.Fasouliotis and Joseph G.Schenker	Authors of " Preimplantation genetic diagnosis principles and ethics" Raises the view of major religions in regard to PGD
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Assessment focus	Band 0	Band 1	Band 2	Band 3
	0	1-4	5-7	8-10
Understanding the influence of different organisations/ individuals.	Level of response not worthy of credit.	Demonstrates isolated elements of knowledge of the influence of different organisations/individuals, on research and/or health issue, with major gaps or omissions.	Demonstrates mostly accurate knowledge and understanding of the influence of different organisations/individuals on research and health issues.	Demonstrates accurate and detailed knowledge and understanding of the influence of different organisations/individuals research and health issues.
		A basic explanation of how the organisation/individual may have an influence is given, but with general statements made and limited links to the article.	An explanation of how these organisations/individuals may influence the issue is given, occasionally supported through some linkage and application to the article.	An explanation of how these organisations/ individuals may influence the issue is given, supported throughout with linkage and application to the article.

Activity 4: Suggest potential areas for further development and/or research of the pre-implantation genetic diagnosis (PGD) issue. (6 marks)

Learners:

- **may include other valid suggestions, not listed below, which should be credited.**
- **may cover a number of examples from the list below.**
- **would NOT be expected to cover all points to get full marks.**

Indicative content

Further research:

- the mechanisms of genetic disease
- more studies to cross reference conclusions
- living with genetic diseases
- alternative treatments for genetic diseases
- regulation of fertility industry to allay fears over eugenics
- medical uses of discarded fetuses
- improve the success of IVF without using PGD.

Further development:

- refine the PGD process to reduce the number of discarded fetuses
- psychological effects of children born to PGD
- cheaper/more efficient ways of delivering the treatment
- cultural effects of providing PGD mainly to a single economic subgroup

Assessment focus	Band 0	Band 1	Band 2	Band 3
	0	1-2	3-4	5-6
Application of understanding to identify areas for further development and/or research	Level of response not worthy of credit.	Demonstrates isolated elements of knowledge of the health issue.	Demonstrates mostly accurate knowledge and understanding of the health issue.	Demonstrates accurate and detailed knowledge and understanding of the health issue.
		Limited identification of areas for further development and/or research	A description for further areas of development and/or research is given, occasionally supported through some linkage and application to the article.	A description for further areas of development and/or research is given, supported throughout with linkage and application to the article.

**Activity 5: A recent headline in a national newspaper said:
PGD: order your Einstein baby from the genetic menu**

You have been asked to write a letter to the editor of this national newspaper to raise awareness of the benefits and limitations of pre-implantation genetic diagnosis (PGD).

When writing your letter you must consider:

- **who is likely to read your letter**
- **what you would like the reader to learn from your letter.**

(16 marks)

Learners:

- **may include other valid suggestions, not listed below, which should be credited.**
- **may cover a number of examples from the list below.**
- **would NOT be expected to cover all points to get full marks.**

Indicative content

- outline of PGD process
- What PGD is not:
 - a way to help an existing child with genetic disease
 - the chance to select for other genetic factors such as sex, appearance or mental ability
 - without significant moral and ethical factors that must be considered
- description/ explanation of how PGD can reduce the chance of a fetus developing genetic disease
- consideration of the benefits
 - links between age of mother and fetus developing genetic disease
 - improved quality of life for child
- explain the cons of PGD – cost, lengthy procedure, invasive - with reference to article
- explain the conditions required to be considered for PGD
 - stable relationship
 - age of mother
 - hormone levels

- availability of tests
- acceptance by PGD specialists
- welfare of child born to PGD
- funding
- the article should be targeted at the editor and readers of the national newspaper, some basic knowledge could be presumed but maybe some terms need to be explained
- any medical treatment should be discussed with a doctor and patients should establish their own judgement of PGD, bearing in mind the requirements of living with genetic disease
- some people with genetic disease can live full, happy lives
- the quality of life debate as a counter argument

Assessment focus	Band 0	Band 1	Band 2	Band 3	Band 4
	0	1-4	5-8	9-12	13-16
Synthesises content ideas and demonstrates an understanding of scientific reporting.	Level of response not worthy of credit.	Identifies some of the key information from the articles.	Summarises the key information and evidence from the articles.	Summarises and attempts to draw together key information using common elements from the articles.	Summarises and consistently draws together key information using common elements from the articles.
		Demonstrates limited understanding of audience or purpose.	Demonstrates some understanding of audience and purpose by some appropriate use of writing style and terminology.	Demonstrates good understanding of audience and purpose by using mostly appropriate writing style and terminology.	Demonstrates comprehensive understanding of audience and purpose by using appropriate writing style and terminology throughout.
		The response will be unstructured and limited to basic points made.	The response shows some structure and coherence.	The response shows a structure that is mostly clear, coherent and logical.	The response shows a well-developed structure that is clear, coherent and logical.