



## ATAR course examination, 2018

### Question/Answer booklet

# EARTH AND ENVIRONMENTAL SCIENCE

Please place your student identification label in this box

Student number: In figures

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In words

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### Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: three hours

### Materials required/recommended for this paper

#### *To be provided by the supervisor*

This Question/Answer booklet

Multiple-choice answer sheet

Number of additional  
answer booklets used  
(if applicable):

#### *To be provided by the candidate*

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: protractor, drawing compass, mathomat, non-programmable calculators approved for use in this examination

### Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Structure of this paper**

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	15	15	20	15	15
Section Two Short answer	10	10	100	110	55
Section Three Extended answer	3	2	60	30	30
<b>Total</b>					100

**Instructions to candidates**

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2018*. Sitting this examination implies that you agree to abide by these rules.
2. Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer booklet.

3. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.
5. The tear-out page is not to be handed in with your Question/Answer booklet.

## Section One: Multiple-choice

15% (15 Marks)

This section has **15** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 20 minutes.

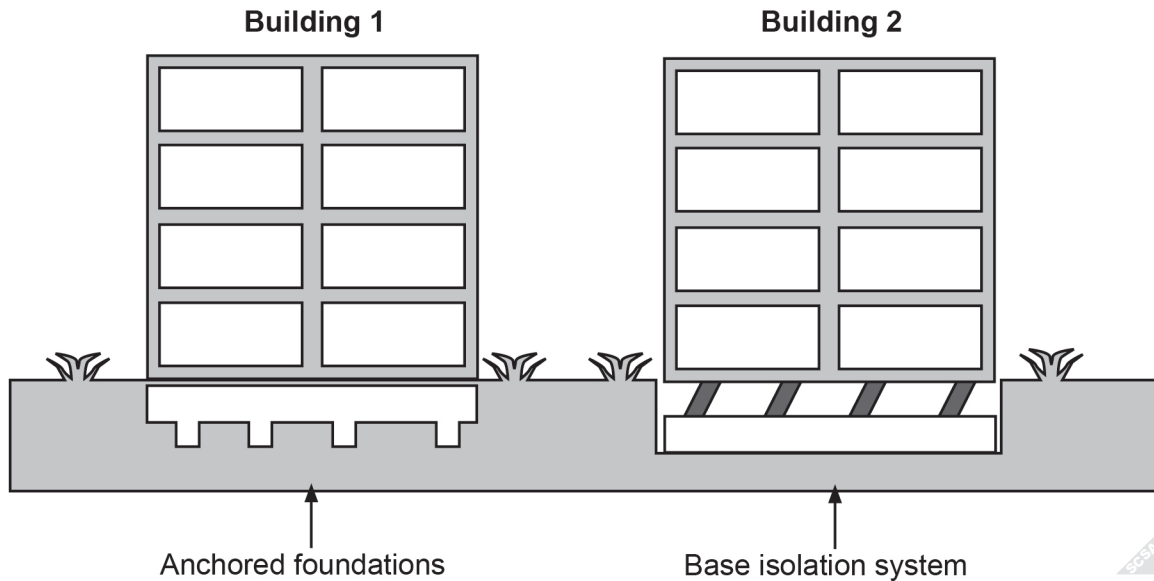
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1. Which of the following lists contains the **four** greenhouse gases with the greatest abundance in the earth's atmosphere?
  - (a) water vapour, carbon dioxide, methane, nitrous oxide
  - (b) carbon dioxide, nitrogen, ozone, water vapour
  - (c) ozone, hydrofluorocarbons, argon, carbon dioxide
  - (d) carbon dioxide, methane, nitrous oxide, ozone
  
2. Which of the following is **least** likely to occur in eastern Australia as a consequence of the weather patterns associated with an El Niño event?
  - (a) increased incidence of bushfires
  - (b) decreased alpine snowfall
  - (c) increased trade winds
  - (d) reduced number of tropical cyclones
  
3. Which of the following lists show the **three most** common gases found in volcanic emissions?
  - (a) water vapour, carbon dioxide, sulfur dioxide
  - (b) oxygen, carbon dioxide, water vapour
  - (c) carbon dioxide, hydrogen sulfide, argon
  - (d) nitrogen, hydrogen chloride, methane
  
4. The earth has experienced a long sequence of alternating glacial and interglacial periods over the past two million years. This cycle is driven primarily by:
  - (a) variations in the eccentricity, axial tilt and precession of the earth's orbit.
  - (b) depletion in the earth's ozone layer due to periods of high volcanism.
  - (c) melting of polar ice altering the earth's major oceanic currents.
  - (d) industrial emissions leading to increased atmospheric carbon dioxide levels.

See next page

5. The changes in mineralogy and texture experienced by a rock during metamorphism occur largely because of
- (a) an increase in temperature.
  - (b) an increase in pressure.
  - (c) its interaction with hydrothermal fluids.
  - (d) all of the above.
6. Humans obtain a range of free benefits from properly-functioning ecosystems. Which of the following lists contains the **three** main categories of ecosystem services?
- (a) biological, geological, ecological
  - (b) provisioning, regulating, supporting
  - (c) regulating, supporting, social
  - (d) economic, cultural, biological
7. Which action would be the **most** effective in minimising the impact of eutrophication in a fresh water river?
- (a) decreasing crop rotation in farm areas
  - (b) increasing the use of fertilisers on crops
  - (c) planting trees along waterways
  - (d) clearing natural vegetation along waterways
8. Which of the following would be **most** likely to present a hazard to people living on a transform plate boundary?
- (a) sinkholes
  - (b) volcanic eruption
  - (c) tsunami
  - (d) earthquake
9. Which of the following processes can cause global sea levels to rise?
- (a) melting of sea ice at the North Pole
  - (b) thermal expansion of ocean water
  - (c) tropical cyclones
  - (d) bleaching of coral reefs

10. Earth hazards can have a significant impact on populated areas, causing damage to infrastructure and threatening life. The diagrams below show two building designs for an earthquake-prone area. Which building is more likely to withstand the effects of an earthquake?

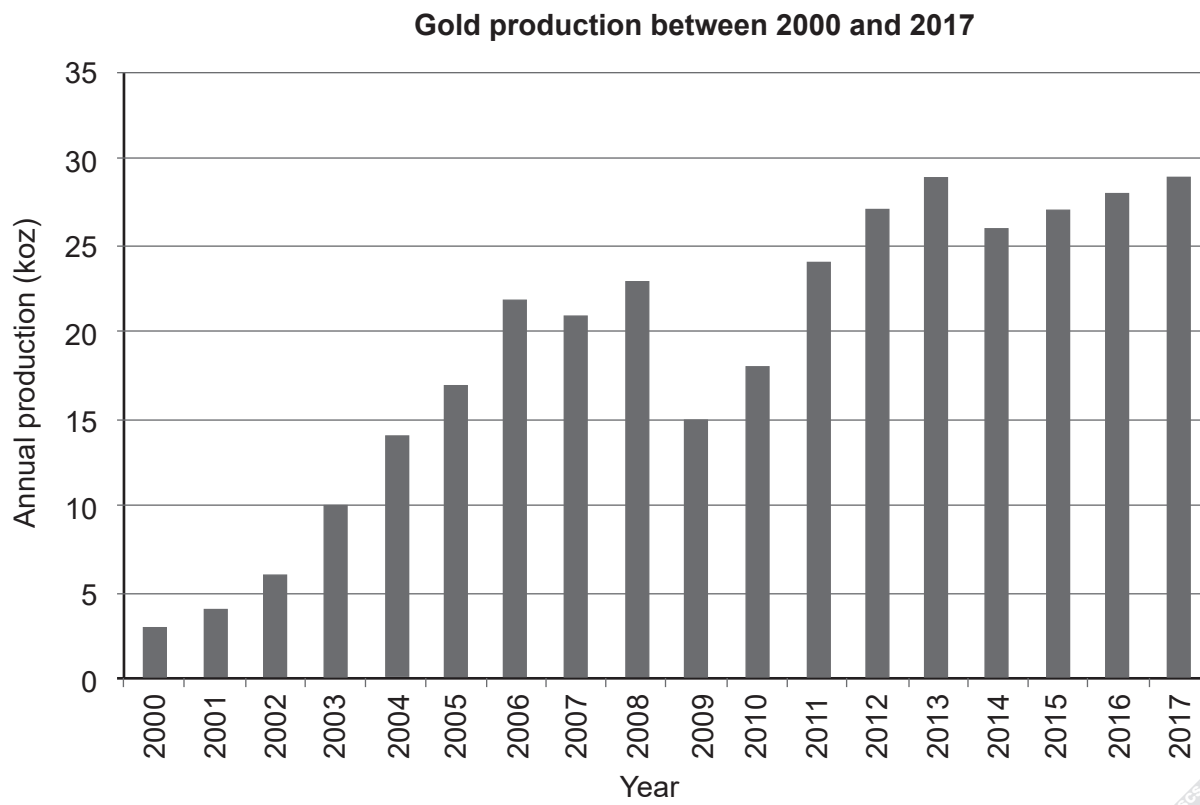


- (a) Building 1  
 (b) Building 2  
 (c) neither Building 1 nor Building 2  
 (d) both Building 1 and Building 2
11. Geophysical techniques, including the measurement of magnetic fields, variations in gravity and the induction of electromagnetic currents, are important elements in modern exploration for mineral resources. Consider the following statements:
- (i) Geophysical techniques can provide information about rocks that cannot be seen or sampled directly at the surface.  
 (ii) Geophysical measurements require detectors to be placed carefully in contact with the ground surface.  
 (iii) Geophysical studies can only be conducted in the presence of groundwater.  
 (iv) Geophysical survey results are invalid after a year and need to be repeated annually.

Which statement(s) above is/are always true?

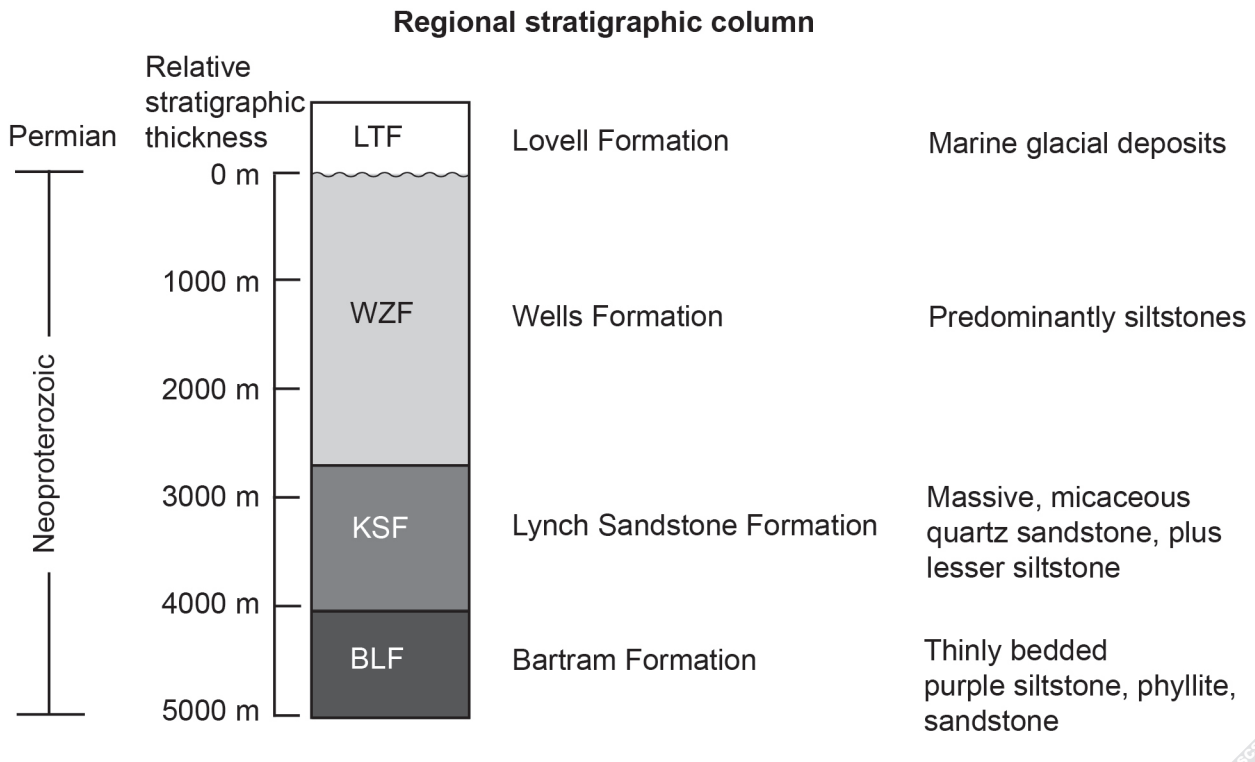
- (a) all of the statements (i), (ii), (iii), and (iv)  
 (b) only statement (iii)  
 (c) only statement (i)  
 (d) statements (i) and (iv)

Questions 12 and 13 relate to an underground gold-mining operation in Western Australia that started production in 2000.



12. The graph above shows gold production from the mine between 2000 and 2017. Which of the following statements can be proven to be true using only the data shown on the graph?
- (a) Gold production has increased in every year of the mine's operation.
  - (b) The mine has at least 10 years of remaining reserves at its current rate of production.
  - (c) The mine was profitable in 2009.
  - (d) Annual gold production has exceeded 20 koz for more than half of the mine's operating life.
13. Which of the statements regarding the long-term viability of the mine is **most** reasonable?
- (a) Because gold is a valuable resource, the mine will continue to be profitable as long as it has reserves of gold remaining.
  - (b) Ceasing production for a year would extend the mine's life by allowing gold reserves to regenerate.
  - (c) New reserves of gold need to be identified by exploration within and around the mine to keep pace with gold production demands.
  - (d) Because the mine already exists, it has no environmental impact on the surrounding area.

The stratigraphic column below shows the geological sequence for a mapped region in Western Australia.



14. On the basis of the information included in this column, which of the following statements is true?
- The Lovell Formation is the youngest rock unit in this sequence.
  - There are no igneous rocks in this sequence.
  - The Bartram Formation is the thinnest Neoproterozoic rock unit in the local sequence.
  - All of the above.
15. Which of the following activities would result in carbon sequestration?
- burning forests, leading to increased atmospheric carbon dioxide levels
  - replanting native vegetation in a previously-cleared area during mine rehabilitation
  - reducing hydrocarbon emissions by banning the use of aerosol spray cans
  - building a seawater desalination plant to mitigate the effects of drought

**End of Section One**

**See next page**

**Section Two: Short answer**

**55% (110 Marks)**

This section has **10** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 100 minutes.

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**Question 16**

**(10 marks)**

Fish, crustaceans (crabs, prawns, crayfish) and molluscs (oysters, mussels) are important renewable resources for Western Australia. They support both recreational fishing and a substantial commercial fishing industry, bringing jobs and income to the State. However, like all renewable resources, these fisheries require careful management.

- (a) Describe how renewable resources (such as fisheries) differ from non-renewable resources. (2 marks)

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- (b) Outline **two** factors that influence the rate at which these resources can be sustainably used. (2 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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- (c) Describe **three** management practices that have been (or could be) implemented to ensure the sustainability of Western Australia's fishing industry. (6 marks)

One: \_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Three: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 17**

**(12 marks)**

On 23 January 2018, an earthquake measuring 7.9 on the Richter scale struck the Gulf of Alaska, triggering tsunami warnings throughout the Pacific. Tsunamis are geological hazards that can lead to extensive destruction of property and loss of life. The word *tsunami* means 'harbour wave' in Japanese.

- (a) Describe how plate tectonic processes cause tsunamis on the shores of adjacent land masses. (4 marks)

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- (b) Explain how **two** different types of scientific data could be used to produce a hazard map showing those regions most at risk of tsunamis. (4 marks)

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- (c) Describe **two** strategies that have been (or could be) implemented to reduce the potential effects of tsunamis on coastal populations. (4 marks)

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**Question 18**

**(10 marks)**

During a field trip, two students mapped the geology of the area and collected samples of the different rocks present.

- (a) The first student wrote the following descriptions of **three** different metamorphic rocks she recognised in the field. For each description, provide an appropriate rock name and list a protolith (original unmetamorphosed rock) that could have been metamorphosed to produce the suggested rock type. (6 marks)

<b>Metamorphic rock description</b>	<b>Rock name</b>	<b>Protolith</b>
A dark, coarse-grained rock consisting of layers of muscovite and biotite alternating with quartz and feldspar layers on a millimetre scale		
A light-coloured, medium-grained rock, consisting of interlocking calcite crystals		
A dark, fine-grained foliated metamorphic rock containing abundant mica. The mica is too fine-grained to be visible to the naked eye, but gives a lustrous sheen on cleaved surfaces		

- (b) When the two students met in the field, the second student claimed to have found metamorphic gneiss in the area, but the first student was not convinced by the description he provided. Write a description of the metamorphic texture and mineralogy of a typical gneiss. (2 marks)

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- (c) List **two** features that could be used to distinguish gneiss from lower-grade metamorphic rocks in the field. (2 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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**Question 19**

**(10 marks)**

Metallic mineral deposits of gold, nickel and iron are examples of non-renewable resources that form over geological time scales. Western Australia is the nation's largest producer of these resources and all three add significantly to the State's wealth. However, extraction of these resources has the potential to harm the environment.

For any **one** of the metallic mineral resources mentioned above:

- (a) Describe how geological processes can lead to the formation of your chosen resource, using specific examples drawn from **one** or more named, real deposits where appropriate. (4 marks)

Resource chosen: \_\_\_\_\_

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- (b) Explain how tectonic setting controls where the type of deposit referred to in part (a) forms. (2 marks)

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- (c) Describe **one** example of how the extraction of your chosen resource can affect the abiotic components of the surrounding ecosystem, and **one** example of how its extraction can affect the biotic components of the surrounding ecosystem. (4 marks)

Abiotic: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Biotic: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Question 20**

**(12 marks)**

Some countries, such as New Zealand and Iceland, produce electric power on a large scale from geothermal fields, while Australia has not been able to do so.

- (a) Describe or show in a labelled diagram how geothermal energy can be harnessed to produce electricity. (2 marks)

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- (b) Name **two** advantages and **two** disadvantages of geothermal energy as a source of electricity by comparison with fossil fuels. (4 marks)

Advantages

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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Disadvantages

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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- (c) Explain how tectonic processes produce thermal conditions that allow the economic production of geothermal electricity. (3 marks)

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- (d) Identify **one** tectonic hazard that might be associated with areas in which geothermal electricity can be produced on a large scale. (1 mark)

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- (e) Describe **one** appropriate measure to minimise the risk posed by the hazard chosen in part (d) to electricity production infrastructure. (2 marks)

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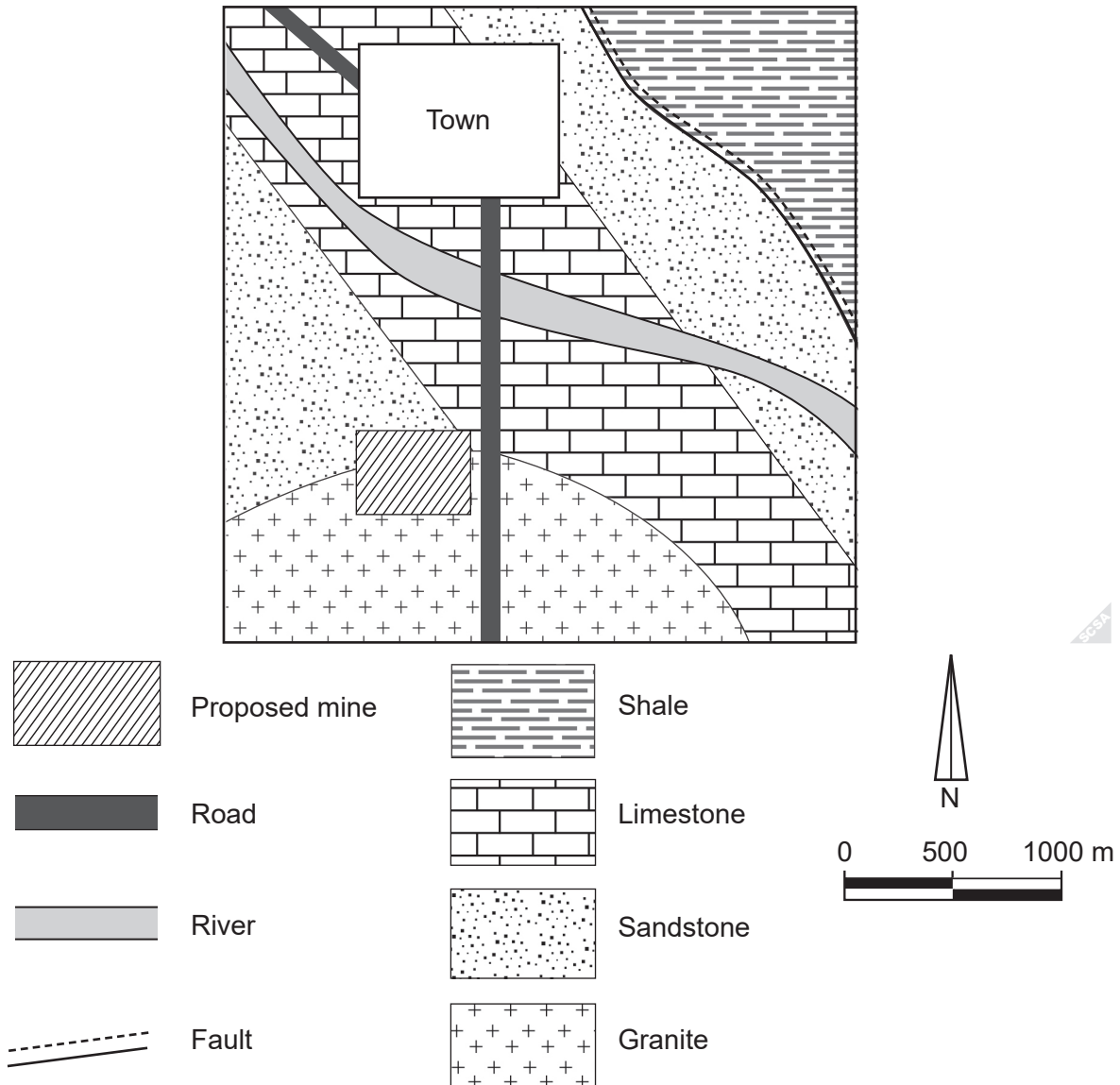
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**Question 21**

**(12 marks)**

Local community considerations and environmental factors must be taken into account during planning for a new mine. The map below shows the location of a proposed mine and its relationship to surrounding geology and ecosystems.



- (a) Mark on the map, using the letter 'X', where you would plan the location of a waste dump/tailings facility. (1 mark)
  
- (b) Explain the specific features of your chosen location that make it the most appropriate site for this facility. (2 marks)

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(c) Mark on the map, using the letter 'Y', where you would plan to locate a monitoring bore for your planned waste dump/tailings facility. (1 mark)

(d) Explain the purpose of a monitoring bore for a waste dump/tailings facility. (2 marks)

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(e) The proposed mine is expected to produce substantial noise and air pollution. Describe **two** methods that could be used to reduce the impact of either of these forms of pollution on the nearby town. (4 marks)

One: \_\_\_\_\_

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Two: \_\_\_\_\_

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(f) Describe **one** method that could be used to reduce the likelihood and/or severity of environmental impacts from the proposed mine on the aquatic ecosystem in the nearby river. (2 marks)

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**Question 22**

**(12 marks)**

Your company has identified a large mineral deposit containing high grades of copper and zinc, and is now carrying out further investigations and planning to evaluate whether it would be economically viable to develop a mine on the site. In the course of these investigations, a population of woylies – a small marsupial listed as critically endangered by the International Union for the Conservation of Nature – has been identified in the area.

- (a) Describe **two** ways that mining might affect the woylies living in this area. (4 marks)

One: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (b) As part of the company's application for a mining licence, you have been asked to prepare a policy for minimising the impact of mining on the woylie population. Describe the steps that you would recommend the company take at the following stages of the project:

- (i) before the start of mining (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (ii) during mining (2 marks)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (iii) at the conclusion of mining (2 marks)

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- (c) You have been asked to develop a list of talking points to help company executives prepare for negotiations with local communities.

- (i) List **two** positive contributions you believe a mine might make to local communities. (1 mark)

One: \_\_\_\_\_

Two: \_\_\_\_\_

- (ii) List **two** objections you anticipate members of local communities may raise to the development. (1 mark)

One: \_\_\_\_\_

Two: \_\_\_\_\_

**Question 23**

**(8 marks)**

The global climate is a dynamic system driven by the incidence, transport and storage of solar energy on Earth over long timescales.

- (a) Identify a natural process that can affect the global climate on timescales of 10 years or longer and describe how this process affects the distribution and storage of solar energy in the atmosphere and/or hydrosphere. (3 marks)

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- (b) Name **two** consequences for the global climate arising from the thermal change you described in part (a). (2 marks)

One: \_\_\_\_\_

Two: \_\_\_\_\_

- (c) Provide a detailed description of how the climate changes you described in part (b) could be identified in records from time periods pre-dating human history. (3 marks)

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**See next page**

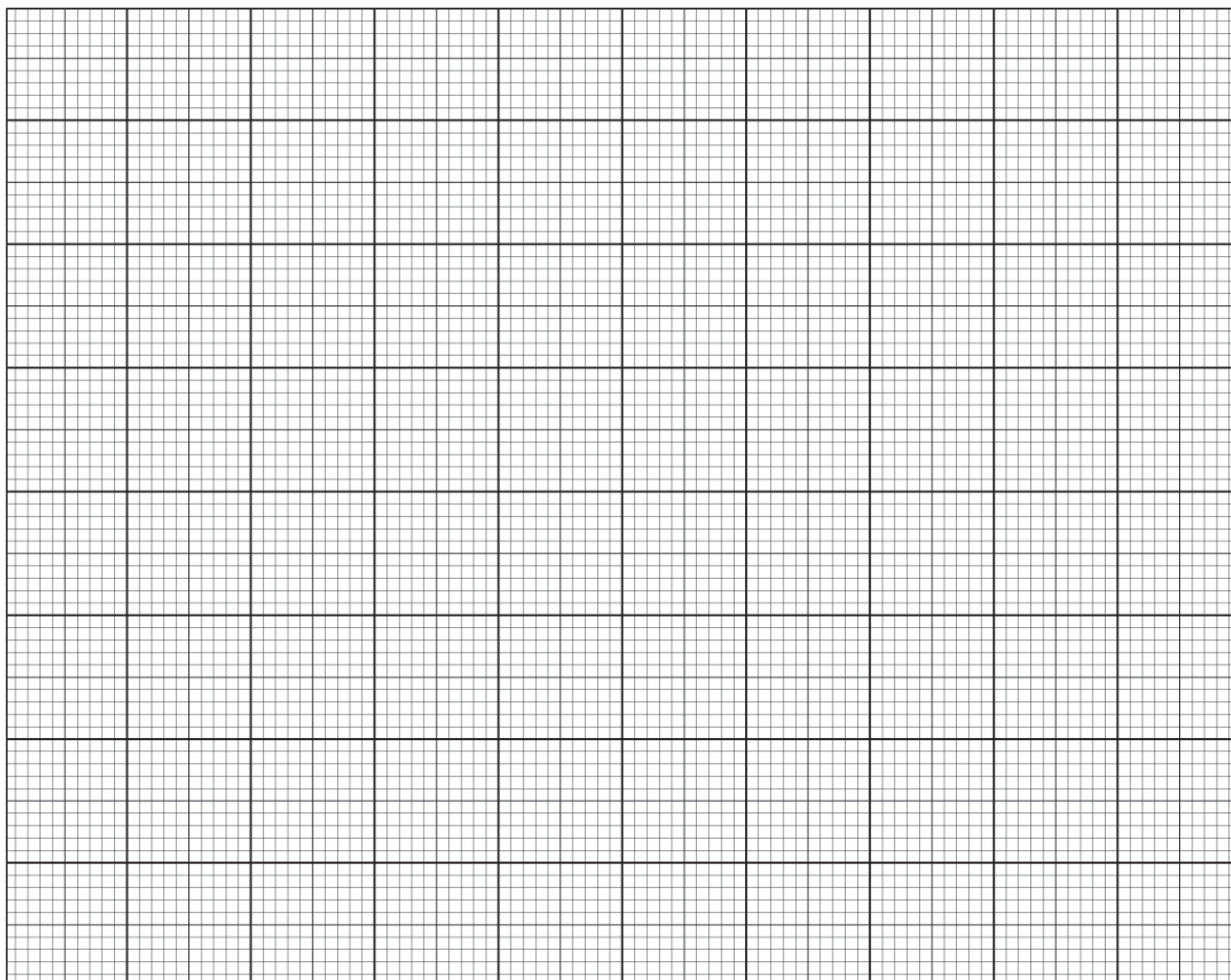
**Question 24**

**(13 marks)**

Palynology is the study of pollen grains and other spores recovered from geological or archaeological deposits. Such materials can provide a valuable record of changes in the vegetation growing in the surrounding area. The table below lists the percentage of pollens from major plant groups recovered from a carefully-dated core sample collected from a coastal swamp in the south-west of Western Australia.

Sample age (years before present)		2000	1700	1300	1100	1000	800	500	0
% of pollen	Eucalyptus	65	62	59	61	60	55	40	25
	Grass	10	12	5	9	20	25	40	60
	Other	25	26	36	30	20	20	20	15

- (a) On the grid provided, draw **one** graph separately plotting the change over time for eucalyptus pollen and for grass pollen. (6 marks)



A spare grid is provided at the end of this Question/Answer booklet. If you need to use it, cross out this attempt.

**See next page**



- (b) Outline **two** long-term vegetation trends indicated by the data in the table. (2 marks)

One: \_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

- (c) Name **one** natural process and **one** human activity that could account for the changing balance of vegetation types suggested in your answer to part (b). (2 marks)

Natural process: \_\_\_\_\_

Human activity: \_\_\_\_\_

- (d) Identify **one** additional source of data (other than palynology) that could help scientists to identify which of your **two** suggestions in part (c) was the actual cause of the observed change in vegetation. (1 mark)

\_\_\_\_\_

\_\_\_\_\_

- (e) Describe what the data source you chose in part (d) would show if the changes in vegetation were the result of a natural process. (2 marks)

\_\_\_\_\_

\_\_\_\_\_

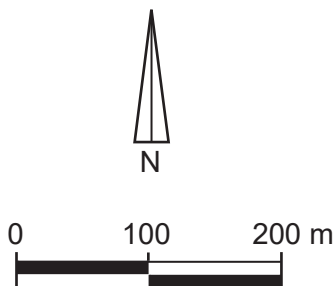
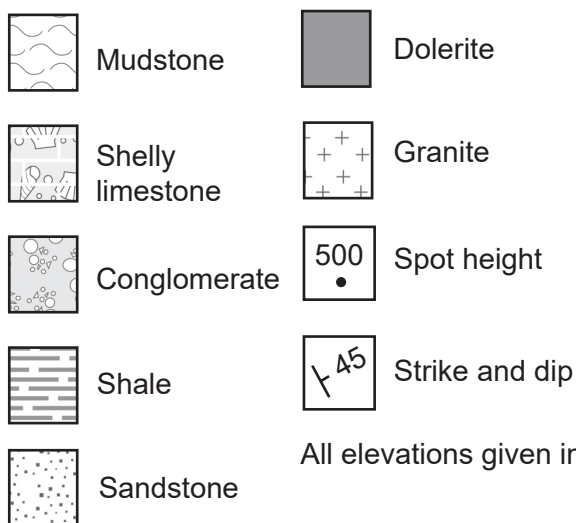
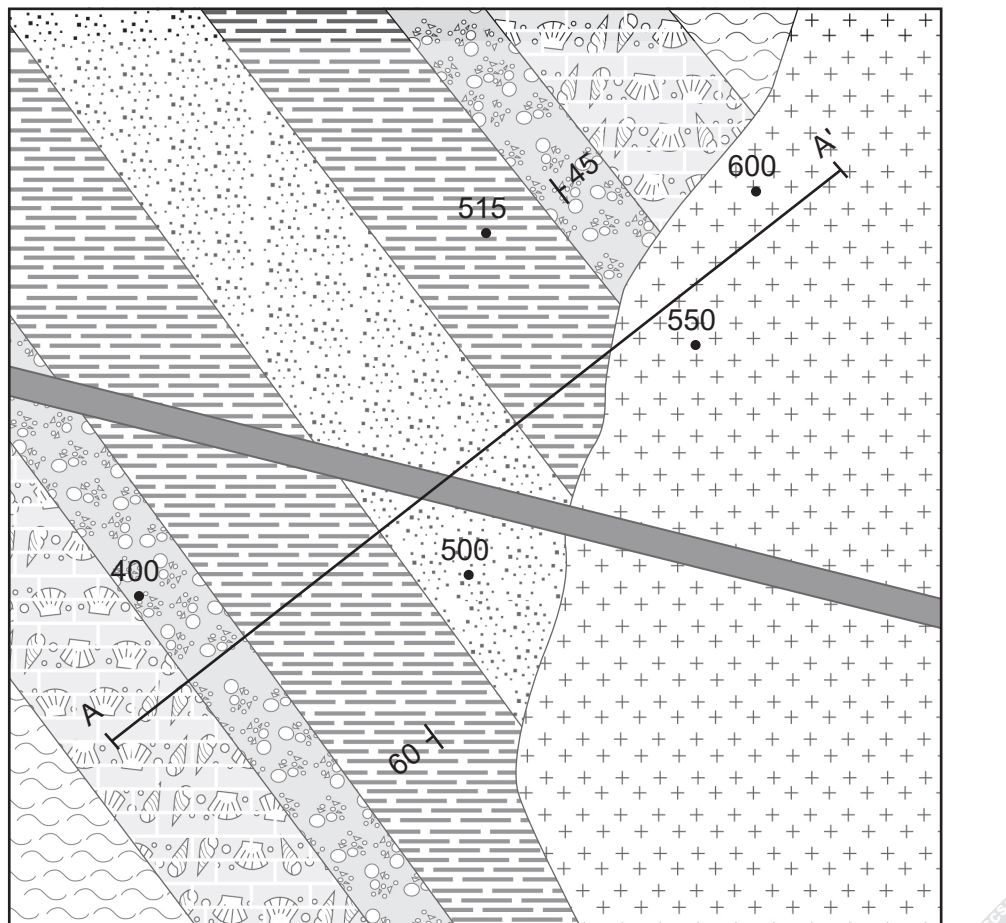
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Question 25

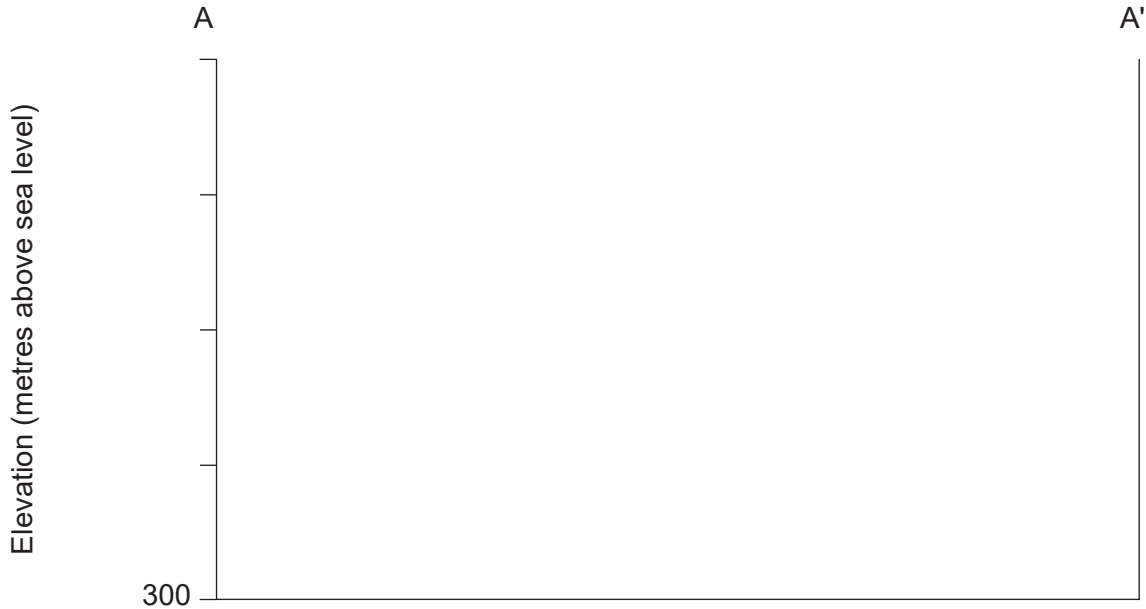
(11 marks)

The map below displays the geology of an area you are investigating. Use this map to answer the following questions.



See next page

- (a) Construct a cross-section of the region along the line A-A' on the section line provided below. Show the actual or inferred distribution of all lithologies cutting this section line and the surface topography. Note: to assist you in transcribing data locations, you may remove page 45 by tearing along the perforations. (6 marks)



- (b) A local exploration company has found a metallic ore deposit exposed at the surface of the area adjacent to the granite at the boundary between the sandstone and shale units. It has developed a hypothesis that this combination of characteristics has controlled the mineralisation of the deposit and that other locations that share the same characteristics are worth exploring for further deposits.
- (i) Based on these geological characteristics, use your cross-section to identify a point below the surface at which similar mineralisation might occur. Mark an 'X' **on the map** on page 26 to show the location on the surface where you would drill a vertical hole to test your prediction. (1 mark)
- (ii) At what depth below the surface would your planned hole be expected to encounter the mineralised zone? (1 mark)
-

**Question 25** (continued)

(c) The student mapping the area noticed a thin zone of metamorphic alteration surrounding the granite.

(i) State an appropriate name for this type of metamorphism. (1 mark)

\_\_\_\_\_

(ii) List **two** textural differences likely to be observed between this alteration zone and the surrounding sediments. (2 marks)

One: \_\_\_\_\_

\_\_\_\_\_

Two: \_\_\_\_\_

\_\_\_\_\_

**End of Section Two**

**See next page**

**Section Three: Extended answer****30% (30 Marks)**

This section contains **three** questions. You must answer **two** questions: the compulsory question (Question 26) and **one** of the other questions (Question 27 or Question 28). Write your answers on the pages provided following Question 28.

If you use a page for planning, indicate this clearly at the top of the page.

Suggested working time: 60 minutes.

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**Question 26****(15 marks)**

The atmosphere is the most dynamic and volatile component of Earth's layered structure and represents a critical control on the planet's climatic systems and the nature and distribution of terrestrial life.

- (a) Describe **one** example of how human activities have changed the composition of the atmosphere. (3 marks)
  
- (b) Discuss how the atmospheric change identified in part (a) can be demonstrated and why it is attributed to human impact rather than natural causes. Your answer should include the sources of scientific data relied upon and identify clearly any assumptions and limitations underpinning the arguments presented. (5 marks)
  
- (c) Explain how your chosen atmospheric change can affect the distribution of **two** plant **and/or** animal species. Use specific examples where possible to describe how these changes relate to the environmental sustainability of the human activity cited in part (a). (4 marks)
  
- (d) Discuss **one** strategy that has been (or could be) implemented by government or individuals to reduce **or** reverse the effects of this atmospheric change. Your answer may include reference to the role of social **or** economic factors in limiting the actions taken. (3 marks)

## Question 27

(15 marks)

Fresh water withdrawal refers to the total quantity of fresh water extracted from all available sources for any purpose, excluding evaporation losses. The table below presents the fresh water withdrawal data for the 10 highest per-person fresh water consuming nations in the world (as measured in the most recent available data).

Country	Fresh water withdrawal (m <sup>3</sup> /year per person)	Population (millions)	% breakdown of fresh water use		
			Domestic use	Industrial use	Farming
Australia	5104	23.2	2	1	97
Burma	2360	55.1	2	17	81
Bangladesh	2194	157.8	5	2	93
Guyana	2187	0.7	2	1	97
Afghanistan	2082	34.1	9	59	32
Azerbaijan	2051	9.9	5	28	67
Malaysia	1916	31.4	3	3	94
South Africa	1837	54.8	4	5	91
United States	1600	326.6	13	46	41
Suriname	1489	0.6	4	3	93

Australia is Earth's driest inhabited continent, with average annual rainfall of 469 mm/yr.

In October 2010, a report of the Prime Minister's Science, Engineering and Innovation Council stated that *'Australia faces major challenges at energy-water-carbon intersections to mitigate climate change while continuing to supply energy and to cope with limited water availability while maintaining an increasing population. These challenges will demand transformational responses'*.

In light of the information provided and your own knowledge, answer the following questions. Use specific examples and evidence to support your arguments where appropriate.

- (a) With reference to its low population, explain Australia's use of water per person and the pressure on water resources. (4 marks)

Australia is forecast to face serious challenges in meeting the water needs of its people as the population grows from 24.1 million in 2016 to as many as 35.9 million by 2050.

- (b) Describe in detail how cultural **and/or** water use policy changes could reduce the demand for water per person over the period. (5 marks)
- (c) Discuss **two** technological solutions that could increase the supply of fresh drinking water for Australia in the next 30 years. (6 marks)

or

See next page

**Question 28****(15 marks)**

You are the exploration manager of a small company that is considering investing in the search for economic mineralisation in a previously-unexplored area. You are required to produce a short report outlining how a range of exploration techniques could be used to test for three different mineral resource types, which should be labelled as options 'A', 'B', and 'C'.

- (a) Choose **three** different mineral resources and for each, identify a specific geophysical or geochemical technique that would be appropriate to test for the presence of the chosen resource. A different exploration technique must be chosen for each of the three resources. (3 marks)
- (b) For each pairing of resource and exploration technique identified in part (a), explain the specific detail of how your selected technique would be applied in an exploration program targeting the chosen mineral resource. (6 marks)
- (c) For each of the **three** exploration techniques described in part (b), explain how the presence of the targeted form of mineralisation would be identified in the results of the exploratory analysis. (6 marks)

**End of questions**































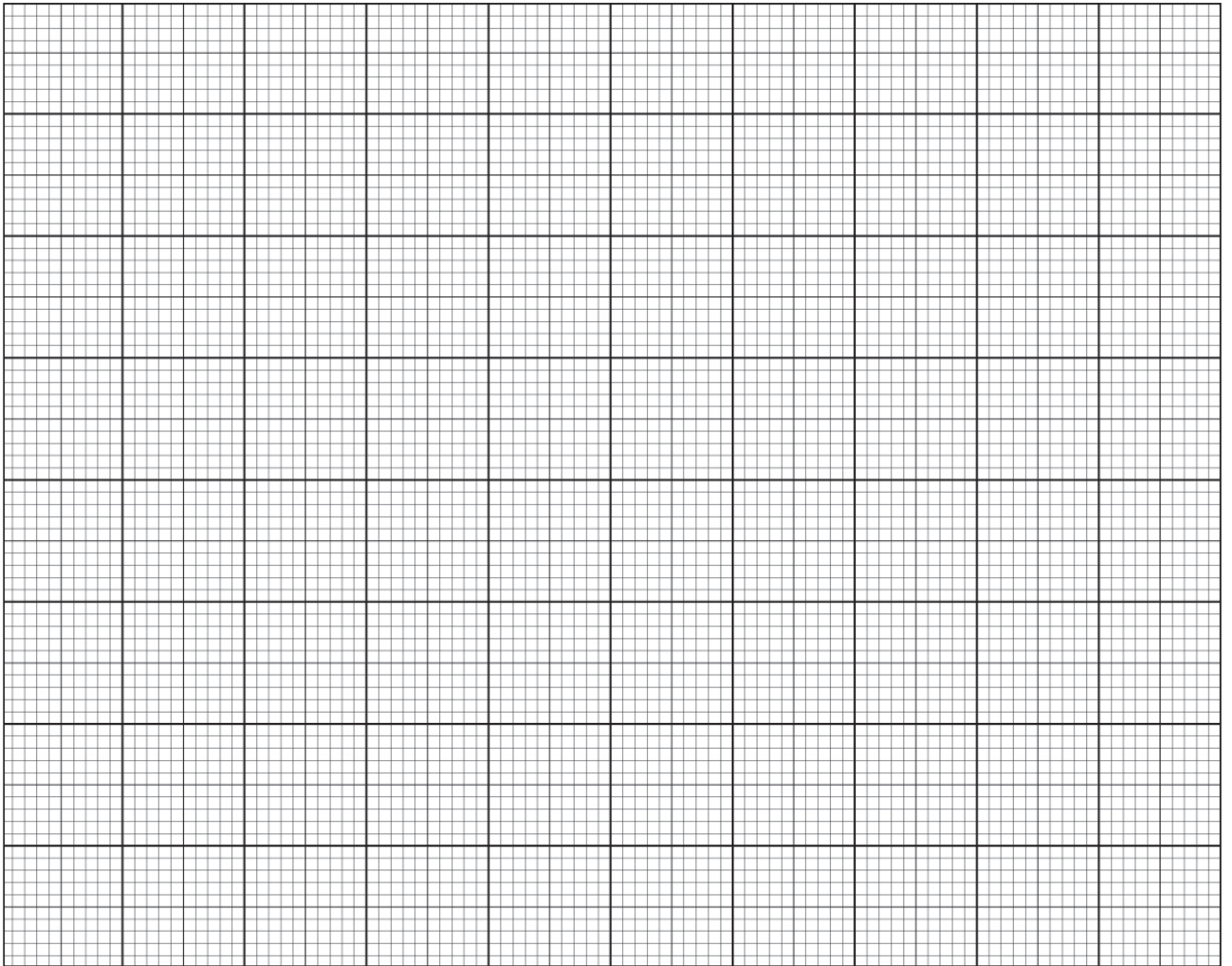
You may tear along the perforations to use this page (to transcribe strata locations for Question 25).

**This page is to be used for transcribing strata locations only**

You may tear along the perforations to use this page (to transcribe strata locations for Question 25).

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Spare grid



## ACKNOWLEDGEMENTS

### Question 27

Sentence 1 adapted from: Fresh water. (2018). In *Wikipedia*. Retrieved May, 2018, from [https://en.wikipedia.org/wiki/Fresh\\_water](https://en.wikipedia.org/wiki/Fresh_water)  
Used under Creative Commons Attribution-ShareAlike 3.0 Unported licence.

Table data source: List of countries by freshwater withdrawal. (2018). In *Wikipedia*. Retrieved May, 2018, from [https://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_freshwater\\_withdrawal](https://en.wikipedia.org/wiki/List_of_countries_by_freshwater_withdrawal)  
Used under Creative Commons Attribution-ShareAlike 3.0 Unported licence.

Table population data source: Central Intelligence Agency. (n.d.). *The world factbook* (Country comparison: Population). Retrieved May, 2018, from <https://www.cia.gov/library/publications/resources/the-world-factbook/rankorder/2119rank.html>

Quote from: Prime Minister's Science, Engineering and Innovation Council. (2010). *Challenges at energy-water-carbon intersections* (p. 7). Retrieved May, 2018, from [http://www.chiefscientist.gov.au/wp-content/uploads/FINAL\\_EnergyWaterCarbon\\_for\\_WEB.pdf](http://www.chiefscientist.gov.au/wp-content/uploads/FINAL_EnergyWaterCarbon_for_WEB.pdf)

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