Government of **Western Australia**
School Curriculum and Standards Authority

GEOGRAPHY

ATAR course examination 2016

Marking Key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

2016/64125

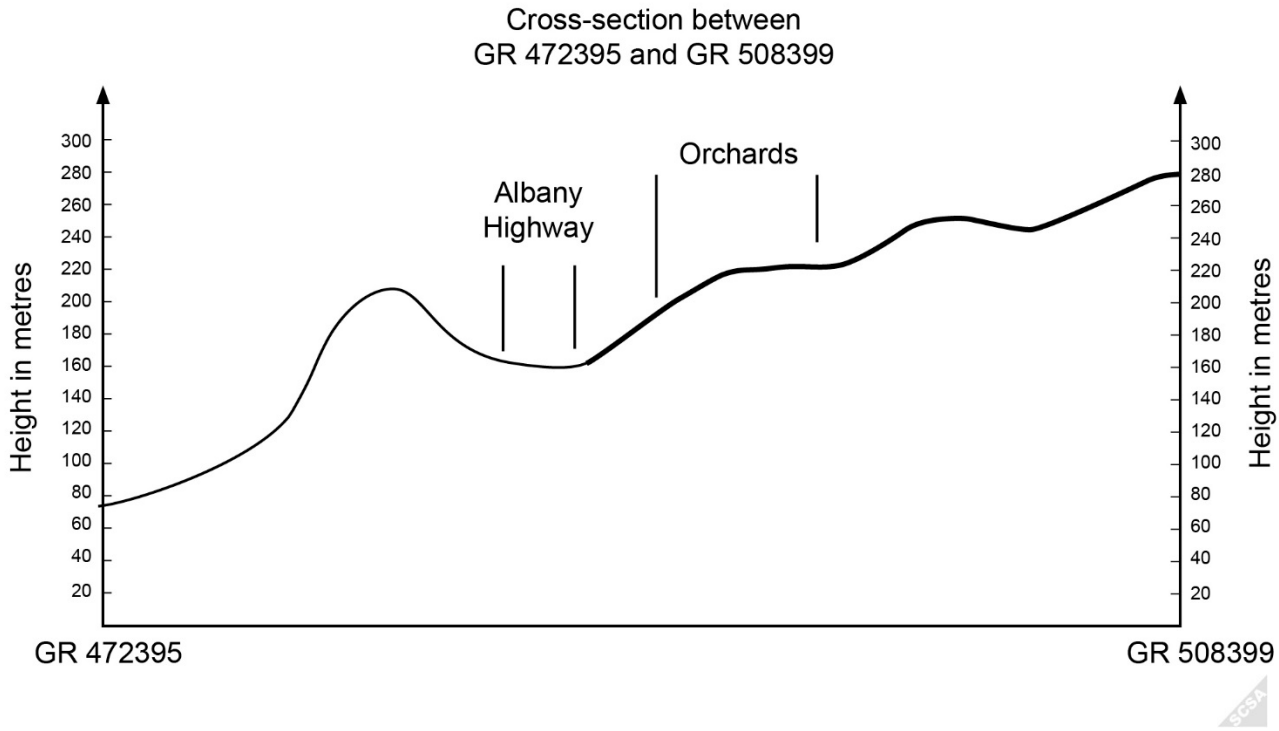
One: Multiple-choice **20% (20 Marks)**

Question	Answer
1	D
2	B
3	C
4	A
5	C
6	B
7	D
8	B
9	C
10	D
11	A
12	C
13	A
14	B
15	A
16	D
17	A
18	C
19	D
20	B

Section Two: Short response **40% (40 Marks)**

Question 21 **(4 marks)**

(a) Complete the cross-section extending from GR 472395 to GR 508399. (2 marks)



Description	Marks
The cross-section must start between 60 - 80 m	1
The cross-section must indicate a maximum height of 200-220 m	1
Total	**2**

(b) Annotate the following features on the cross-section above:
- Albany Highway
- one orchard. (2 marks)

Description	Marks
Both features are labelled correctly on the cross-section (within the accepted parameter – refer to transparency)	2
One feature is labelled correctly on the cross-section (within the accepted parameter – refer to transparency)	1
Total	**2**

Question 22 **(3 marks)**

(a) With specific reference to **Sources 1** and **2**, describe the location and nature of the land use change that has occurred west of easting 48 and south of northing 36. (2 marks)

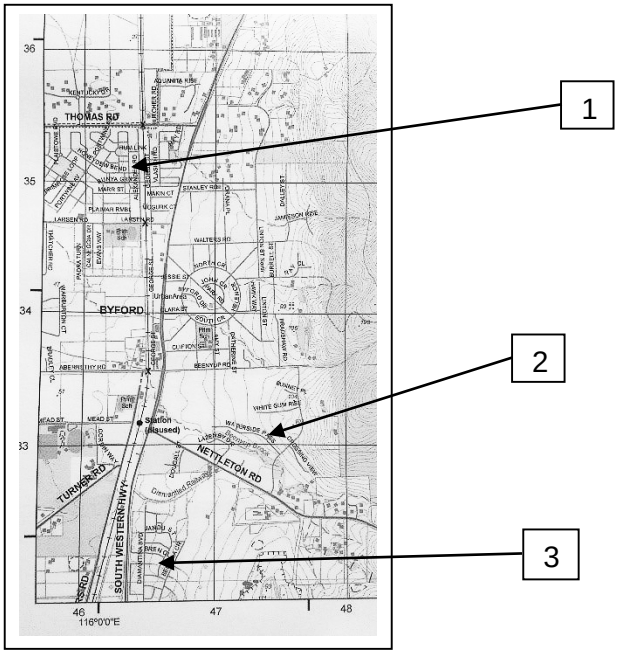
Description	Marks
Describes the location of land use change within the designated area	1
Describes the nature of land use change within the designated area	1
Total	**2**

Answers could include:

Reference to the location and nature (type) of land use change within designated area – with specific reference to the map i.e. location via either GR, AR or relative location such as adjacent to Thomas Road.

Location:
New urban areas have expanded in three areas within the designated zone – they are located to the NE of the old Byford townsite adjacent to Thomas Road (1), between Beenyup Rd and Nettleton Road south of the old townsite of Byford (2) and a smaller area adjacent to the South Western Highway near the border of the map (3).

Nature of land use change:
The change is urban growth.
Another acceptable answer is the expansion of the road network in the areas described above.



(b) Identify **one** urban process that has contributed to the land use change given in part (a). (1 mark)

Description	Mark
Answers could include: • urban planning, invasion/succession, urban growth, urban sprawl, land use competition	1
Total	**1**

Question 23 **(3 marks)**

Describe the sequence of land cover changes that occurred in the area east of easting 49 and south of northing 35 between 1985 and 2011.

Description	Marks
Describes accurately and in detail the sequence that the area was forested, cleared and then reafforested/ rehabilitated	3
Outlines that the area was forested, cleared and then reafforested/rehabilitated	2
Identifies that the area was either forested, cleared or reafforested/rehabilitated	1
Total	**3**

Answers could include:

Example of detailed answer:

- In 1985 the area was predominantly bush/forested area with mining beginning in the southern portion of the map.
- Between 1985 and 2011, mining expanded further north where forested areas were cleared and then rehabilitated. Reafforestation occurred later.
- The 2011 topographic map indicates no further mining within the designated area, i.e. the sequence of land cover was forest, mine/quarry then reafforestation.

Question 24 **(2 marks)**

What is a natural biome?

Description	Marks
Correct detailed answer of what a natural biome is. Makes clear that a natural biome has distinct characteristics	2
Correct answer with some of the elements of what a natural biome is	1
Total	**2**

Answers could include:

Example of a detailed answer:
A natural biome is a community that has distinct vegetation, climate and soil characteristics that impact upon the traits of species of flora and fauna that live in the area. These species evolve similar adaptations to these distinct conditions e.g. desert areas – xerophytic adaptations.

Notes:
Natural biomes are organised biological communities of the earth based on similarities in the dominant vegetation, climate, geographic location, and other characteristics. Aspects of the physical environment such as precipitation, temperature, and water depth, have a strong influence on the traits of species living in that natural environment, and thus biological communities experiencing similar environmental conditions often contain species that have evolved similar characteristics.

Question 25 **(3 marks)**

Explain the concept of climate change.

Description	Marks
Explains in detail the concept of climate change including space, time and variability	3
Explains the concept of climate change	2
Provides a definition or outline of climate change	1
Total	**3**

Answers could include:

Example of a detailed answer must include all three variables:
The concepts of space, time and variability of long term weather patterns and the application of scale to all three variables. The answer clearly demonstrates how climate change applies to global – regional areas, varies according to time – decades to millennia and varies according to long term weather patterns i.e. global warming and ice age events.

Notes:
Climate change is a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. It may be a change in the average weather conditions or a change in the distribution of weather events with respect to an average, for example, greater or fewer extreme weather events. Climate change may be limited to a specific region, or may occur across the whole earth. Variations in temperature may result in either global cooling, i.e. ice ages or global warming. In recent history, certain human activities have also been identified as significant causes of recent climate change, often referred to as ‘global warming’.

Question 26 **(4 marks)**

Identify **one** process responsible for land cover change and outline its impact on local **or** regional environments.

Description	Marks
Correctly identifies one process responsible for land cover change	1
Outlines the environmental impact of the process on either local or regional environments	3
Outlines any impacts on environments	2
States a process i.e. brief description of process rather than impact	1
Total	**4**

Answers could include:

Land cover change:
This could include any one of the following – deforestation, the expansion and intensification of agriculture, rangeland modification, land and soil degradation, irrigation, land drainage and reclamation, and the growth of urban settlement, industry and mining.

Environmental impact:
This could include any one of the following outlined in detail – changes to the water cycle, soil erosion and degradation, loss of habitat and biodiversity, the degradation of aquatic and marine environments, loss of ecosystem services, changes to regional climates, and urban heat islands.

Question 27 **(6 marks)**

Describe **two** projected impacts of global climate change **or** biodiversity loss.

Description	Marks
2 impacts x 3 marks each	
Detailed description of an impact of global climate change or biodiversity loss	3
Describes briefly an impact of global climate change or biodiversity loss	2
States an impact of global climate change or biodiversity loss	1
Total	**6**

Answers could include:

Global climate change:
Describes at least two projected impacts of global climate change. Identifies the main global climate changes including temperature and precipitation changes, rising sea level and an increase in extreme weather events, e.g. drought, heat waves, storms, heavy precipitation (localised flooding). As a result of these changes, there is an impact on human activities such as threats to water resources, food production, health and settlement. May also describe the impact on natural biomes (this can include both terrestrial and marine environments) such as shifts in ecosystems, invasion and succession of species, seasonal patterns of flora and fauna, changes in ecosystem processes i.e. nutrient cycling.

Biodiversity loss:
Describes at least two projected impacts of the biodiversity loss. These can include a description of any two of the following – impacts on natural biomes include simplification of ecosystems, habitat loss, reduction of productivity, reduction of ecosystem services – water filtration, nutrient cycling, soil formation (decomposition), and reduced species interaction modifying nutrient and energy pathways. Impact upon human activity can include changes that reduce sources of food, fuel, structural materials, medicinal or genetic resources.

Question 28 **(6 marks)**

Identify **two** significant challenges facing your chosen location and describe the views and attitudes of a major stakeholder group for each challenge.

Description	Marks
(3 marks x 2 challenges = 6 marks)	
Correctly identifies one challenge	1
Correctly identifies major stakeholder group	1
Describes the views and attitudes of a major stakeholder group relating to the challenge identified	1
subtotal	3
Total	**6**

Answers could include:

Challenges from any of the following:
Housing, economic restructuring, employment, transportation congestion, environmental degradation, waste management, personal safety, land abandonment, urban sprawl, socio-spatial inequality, social inclusion and exclusion, changing demographics.

Accept valid/appropriate major stakeholder groups and views and attitudes related to challenges selected.

Question 29 **(4 marks)**

(a) Identify **two** world areas in which the process of urbanisation has reversed temporarily. (2 marks)

Description	Marks
Correctly identifies both China and Oceania	2
Identifies one only either China or Oceania	1
Total	**2**

(b) Identify the world area in which urbanisation rates will increase **most** between 1950 and 2050. (1 mark)

Description	Marks
Correctly identifies China.	1
Total	**1**

(c) Identify the approximate year in which China is predicted to attain the Oceanian rate of urbanisation. (1 mark)

Description	Marks
Correctly identifies any year between 2036–2042 inclusive	1
Total	**1**

Question 30 **(5 marks)**

With specific reference to **Source 8**, describe the implications for world population growth resulting from the process of urbanisation.

Description	Marks
Describes, using detailed data from Source 8, the implications for world population growth resulting from the process of urbanisation	4–5
Outlines trends in the data for both world population growth and urban populations with some reference to Source 8	2–3
Identifies data associated with either world population growth or urban population	1
Total	**5**

Answers could include:

Example of a detailed answer which must include data from Source 8
A description of how with increasing urban population, i.e. urbanisation, total world population growth rate decreases over time. Reference to the table should indicate that urbanisation has occurred, note the changing ratio between urban and rural populations. For example, 0.75/1.78 in 1950 to 6.34/3.21 in 2050. As proportion or urban population increases, world population growth increases but at a lower rate. For example, 1.9% in 1950 to 0.63% in 2050.

Section Three: Extended Answer **40% (40 Marks)**

Question 31 **(20 marks)**

(a) Explain the natural and anthropogenic causes of global climate change **or** biodiversity loss. (10 marks)

Description	Marks
Detailed, clear explanation of the major natural and anthropogenic causes with possible examples of global climatic change or biodiversity loss. Demonstrates a clear understanding of the distinction between natural and anthropogenic causal factors using accurate and relevant geographical terminology	9–10
Explains the major natural and anthropogenic causes of global climatic change or biodiversity loss. Demonstrates some understanding of the distinction between natural and anthropogenic causal factors using accurate and relevant geographical terminology	7–8
General description of at least one of the natural and anthropogenic causes of global climatic change or biodiversity loss. Demonstrates some understanding of why these are causal factors using appropriate geographical terminology	5–6
Limited description of at least one natural and one anthropogenic causes of global climatic change or biodiversity loss misusing geographical terms. Demonstrates basic understanding of why these are causal factors but shows no understanding of the distinction between natural and anthropogenic	3–4
Outlines a cause of change for climatic change or biodiversity loss.	1–2
Total	**10**

Answers could include:

Climate change
A detailed answer should include more than one anthropogenic cause of climate change (e.g. increased emission of greenhouse gases resulting from human activity and land use such as fossil fuel combustion (i.e. electricity supply, transport, urban living and land clearing i.e. increase in agriculture).
Describes in detail more than one natural cause of climate change – solar activity, orbital patterns, plate tectonics, geological process, atmospheric chemistry, atmospheric wind patterns.

or

Biodiversity loss
A detailed answer should include more than one anthropogenic cause of biodiversity loss (e.g. growth in human population; increased consumption of natural resources such as water, energy and living organisms; land uses such agriculture, forestry, urban settlement and industry, alteration and loss of habitats, introduction of exotic species i.e. pests, pollution).
The answer should also describe in detail more than one natural cause of biodiversity loss – habitat loss, climate change, speciation, invasion and succession, calamity (extinction event).

Question 31 (continued)

(b) Describe **two** examples of human activity and explain how each has adapted to or may be required to adapt to global climate change **or** biodiversity loss. (10 marks)

Description	Marks
2 examples x 5 marks each	
Detailed, clear description and explanation of how human activity has adapted to or may be required to adapt to global climate change **or** biodiversity loss using accurate geographical terminology	5
Detailed description and explanation of how human activity has adapted to or may be required to adapt to global climate change **or** biodiversity loss using relevant geographical terminology	4
General description and explanation of how human activity has adapted to or may be required to adapt to global climate change **or** biodiversity loss using geographical terminology	3
Limited description and some explanation of how human activity has adapted to or may be required to adapt to global climate change **or** biodiversity loss using some geographical terminology	2
Outlines with no explanation of how human activity has adapted to or may be required to adapt to global climate change **or** biodiversity loss misusing geographical terminology	1
subtotal	5
Total	**10**

Answers could include:

An understanding of the concept of adaptation (i.e. 'to adapt' rather than 'to mitigate') in their response. For example desalination plants, drought tolerant crops, reafforestation. An explanation of how the example used adapts to the adverse effects of either climate change or biodiversity loss. For example construction of desalination plants adapts to a shortage of precipitation/runoff patterns i.e. threat to water supply.

Extensive use of detailed and accurate evidence employed in a manner that comprehensively supports the description and explanation. Uses data (e.g. examples, sources and statistics) that develop and strengthen the description and explanation.

Uses accurate and relevant geographical terms.

Question 32 **(20 marks)**

(a) With reference to specific examples, explain the interrelationships between land cover change and either climate **or** biodiversity loss. (10 marks)

Description	Marks
Detailed explanation, using specific examples to support the explanations, of interrelationships between land cover change and climate **or** between land cover change and biodiversity loss i.e. including an appreciation of their bi-directional nature	9–10
Explanation using examples to support the description, of interrelationships between land cover change and climate, including changes to surface reflectivity (albedo) and the process of natural carbon sequestration **or** Explanation using examples to support the description, of interrelationships between land cover change and biodiversity loss, including shifting ecological boundaries, evolutionary diversification and species extinction	7–8
Description, using examples to support the description, of interrelationships between land cover change and climate, with reference to either changes to surface reflectivity (albedo) or the process of natural carbon sequestration **or** Description, using examples to support the description, of interrelationships between land cover change and biodiversity loss, with reference to either shifting ecological boundaries, evolutionary diversification and species extinction	5–6
Outlines, using an example, a relationship between land cover change and climate, with reference to either changes to surface reflectivity (albedo) or the process of natural carbon sequestration **or** Outlines, using an example, a relationship between land cover change and biodiversity loss, with reference to either shifting ecological boundaries, evolutionary diversification and species extinction	3–4
Outlines but makes little or no attempt to describe the interrelationships between the two processes. No relevant examples are provided	1–2
Total	**10**

Answers could include:

Land cover change and climate, including changes to surface reflectivity (albedo) and the process of natural carbon sequestration. Specific examples included to demonstrate the complexity of interrelationships, i.e. including an appreciation of their bi-directional nature.

Land cover change and biodiversity loss, including shifting ecological boundaries, evolutionary diversification and species extinction. Specific examples included to demonstrate the complexity of interrelationships, i.e. including an appreciation of their bi-directional nature.

Question 32 (continued)

Description of possible interrelationships:

Interrelationships between climate and land cover change
Vegetation and soils typically act as a carbon sink, storing carbon dioxide that is absorbed through photosynthesis. When the land is disturbed, the stored carbon dioxide—along with methane and nitrous oxide—is emitted, re-entering the atmosphere. Carbon dioxide, methane, and nitrous oxide are greenhouse gases, which contribute to global warming. The clearing of land can result in soil degradation, erosion, and the leaching of nutrients; which can also possibly reduce its ability to act as a carbon sink. This reduction in the ability to store carbon can result in additional carbon dioxide remaining in the atmosphere, thereby increasing the total amount of greenhouse gases.

There are two types of land cover change: direct anthropogenic (human-caused) changes and indirect changes. Examples of anthropogenic changes include deforestation, reforestation and afforestation, agriculture, and urbanization. Indirect changes include those changes in climate or in carbon dioxide concentrations that force changes in vegetation. A 2002 NASA study argued that human-caused land surface changes in areas like North America, Europe, and Southeast Asia redistribute heat within the atmosphere both regionally and globally. On a global scale, carbon dioxide emissions from land use changes represent an estimated 18% of total annual emissions; one-third of that from developing countries and over 60% from the lesser developing countries.

The effect of land use on the climate primarily depends on the type of land cover present within an area. For example, if rainforest is removed and replaced by crops, there will be less transpiration (evaporation of water from leaves) leading to warmer temperatures in that area. On the other hand, if irrigation is used on farmland, more water is transpired and evaporated from moist soils, which cools and moistens the atmosphere. The additional transpiration can also affect levels of precipitation and cloudiness in an area. In regions with heavy snowfall, reforestation or afforestation would cause the land to reflect less sunlight, resulting in the absorption of more heat on the land. This would, in turn, result in a net warming effect despite the removal of carbon dioxide from the atmosphere through the process of photosynthesis during the growing season. Additional reforestation could increase transpiration, leading to more water vapour in the air. In the troposphere, water vapour is considered to be the biggest greenhouse gas contributor to global warming.

Urbanisation can affect the climate. Local climates tend to be warmer due to the increased amount of heat released within a densely populated area. Average temperatures in city centres can increase even more due to the high density of construction materials such as pavement and roofing materials since they tend to absorb, rather than reflect, sunlight. The phenomenon of higher urban temperatures, compared to lower temperatures in the surrounding rural areas, is known as the urban heat island effect.

(b) Describe **two** current or proposed environmental strategies and explain how each aims to mitigate the adverse effects of global climate change **or** biodiversity loss. (10 marks)

Description	Marks
2 strategies x 5 marks each	
Detailed description, using accurate and relevant geographic terminology, of the strategy provided. Detailed explanation, with detailed and accurate evidence, of how it aims to mitigate the adverse effects of global climate change or biodiversity loss	4–5
Description using accurate and relevant geographic terminology, of the strategy provided. An explanation, with some evidence, of how it aims to mitigate the adverse effects of global climate change or biodiversity loss	2–3
Limited description, using some geographic terminology, of the strategy provided. Limited explanation, with little evidence, of how it aims to mitigate the adverse effects of global climate change or biodiversity loss	1
subtotal	5
Total	**10**

Answers could include:

Strategy
Climate change – describes strategies that provide water security as a result of changing rainfall patterns e.g. desalination plants.

or

Biodiversity loss – describes strategies that reduce habitat loss e.g. land conservation and national parks.

Aim to mitigate
Should include evidence (e.g. examples, sources and statistics) that develops and strengthens the explanation.

Part B: Answer either Question 33 or 34.

Question 33 **(20 marks)**

(a) Describe the site and internal morphology of metropolitan Perth **or** a regional urban centre in Western Australia. (8 marks)

Description	Marks
Site	
Detailed description of the site of metropolitan Perth **or** a regional urban centre in Western Australia	3–4
Describes some of the site features of **either** metropolitan Perth **or** a regional urban centre in Western Australia	1–2
subtotal	4
Internal morphology	
Describes in detail the pattern of the internal morphology of **either** metropolitan Perth **or** a regional urban centre in Western Australia with detail of land uses and details of their relative location within the settlement	3–4
Describes some of the internal morphology of **either** metropolitan Perth **or** a regional urban centre in Western Australia with some detail of land uses and an outline of their relative location within the settlement	1–2
subtotal	4
Total	**8**

Answers could include:

Site:
Description should include a description of site features such as proximity to major landform features and landform upon which it is built, i.e. access to water, slope, ease of accessibility, drainage.

Internal morphology:
Description should include various land uses with reference to their size/area and relative location to the main CBD (or main node) of the settlement.

To answer Question 33(b), refer to **one** planning strategy adopted in metropolitan Perth **or** a regional urban centre in Western Australia and **one** planning strategy adopted in a megacity.

(b) Explain how these planning strategies aim to enhance/have enhanced the sustainability and liveability of **each** of the two locations. (12 marks)

Description	Marks
2 x planning strategies adopted x 6 marks each **(1 x metropolitan Perth or a regional urban centre** **1 x megacity)**	
Identifies a planning strategy and clearly explains, using accurate and relevant geographic terminology, how it has enhanced sustainability and liveability. Includes in the explanation the key features and characteristics of the planning strategy	5–6
Identifies a planning strategy and explains, using geographic terminology, how it has enhanced sustainability and liveability. Includes in the explanation some of the features and characteristics of the planning strategy	3–4
Identifies a planning strategy and outlines with some generalisations, misusing geographic terminology at times, how it has enhanced sustainability and liveability	1–2
subtotal	6
Total	**12**

Answers could include:

Note: Answers must address both sustainability and liveability.

Key features and characteristics could include e.g. a relationship between the planning strategy and sustainability and liveability for example how does 'liveable neighbourhoods' enhance the sustainability and liveability in its location – by increasing accessibility for all modes of transport, protecting/preserving the natural environment, having a diverse local economy, amenity, etc.

Uses evidence (e.g. examples, sources and statistics) that develop and strengthen the explanation.

Question 34 **(20 marks)**

(a) Describe the nature, scope and causes of any **two** significant challenges confronting metropolitan Perth **or** a regional urban centre in Western Australia. (8 marks)

Description	Marks
2 challenges x 4 marks each	
Describes in detail the nature (characteristics), scope (scale) and causes of one significant challenge confronting metropolitan Perth **or** a regional urban centre in Western Australia	3–4
Describes the nature (characteristics), scope (scale) and/or causes of one significant challenge confronting metropolitan Perth **or** a regional urban centre in Western Australia	1–2
subtotal	4
Total	**8**

Answers could include:

Challenges can include the following:
Housing, economic restructuring, employment, transportation congestion, environmental degradation, waste management, personal safety, land abandonment, urban sprawl, socio-spatial inequality, social inclusion and exclusion, changing demographics.

To answer Question 34 (b), refer to **one** challenge facing metropolitan Perth **or** a regional urban centre in Western Australia and **one** different challenge in a megacity.

(b) Explain how a planning strategy has addressed/is addressing these challenges in **each** of the two locations. (12 marks)

Description	Marks
2 challenges x 6 marks each **(1 x challenge facing metropolitan Perth or regional urban centre** **1 x different challenge in megacity)**	
Explains how a planning strategy has addressed/is addressing a challenge. Extensive use of detailed evidence using relevant geographic terms.	5–6
Describes how a planning strategy has addressed/is addressing a challenge. Use of some evidence, using relevant geographic terms.	3–4
Outlines how a planning strategy has addressed/is addressing a challenge. Information might be in dot point form and may misuse geographic terms. Limited evidence used and response contains generalisations.	1–2
Subtotal	6
Total	**12**

Answers could include:

Planning strategy addressing a challenge could be a relationship between the planning strategy and the issues relating to the challenge, for example challenge – urban sprawl – Perth 2030 and local government rezoning to allow greater infill in established suburbs. Increase residential density less demand for residential development in outer suburbs.

Uses evidence (e.g. examples, sources and statistics) that develops and strengthens the explanation.

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