

External assessment

Stimulus book

Earth & Environmental Science

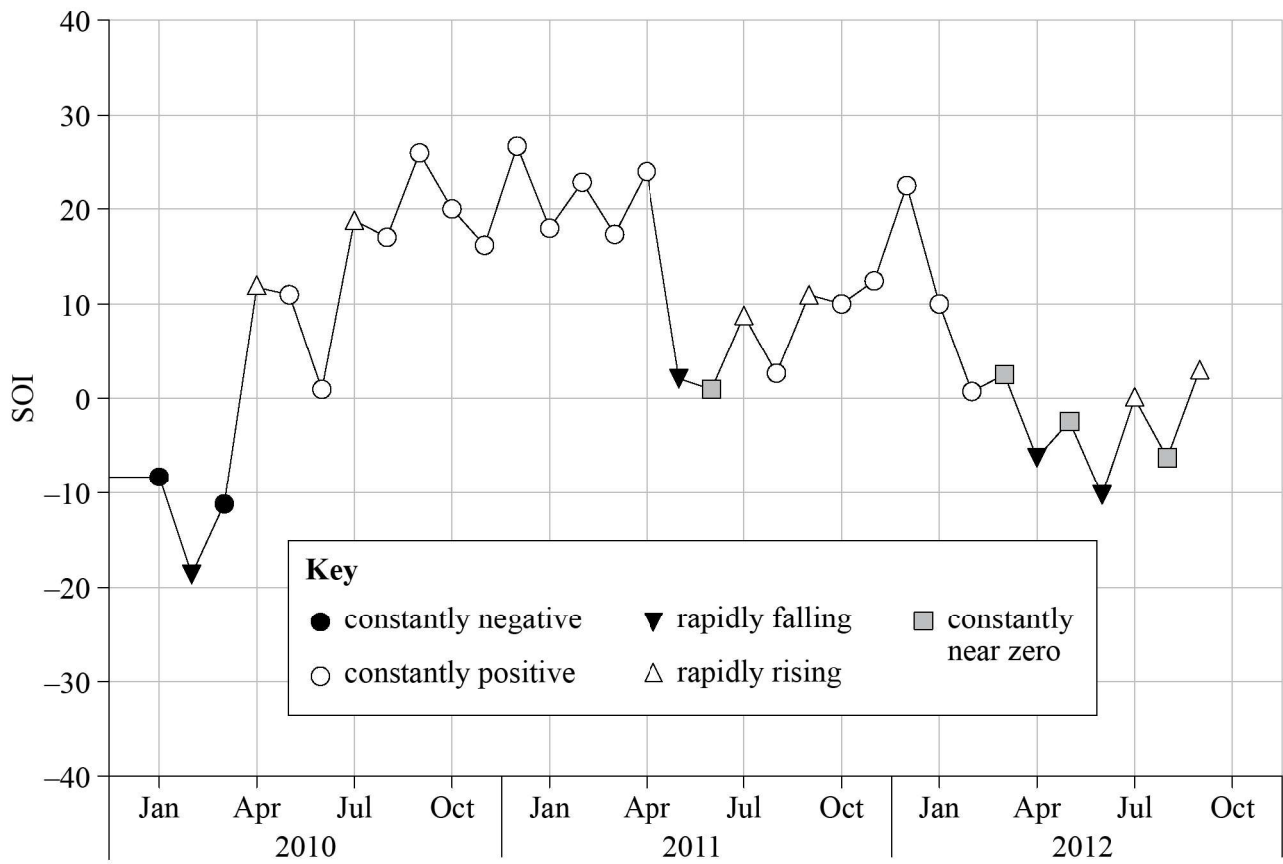
Paper 2

General instruction

- Work in this book will not be marked.

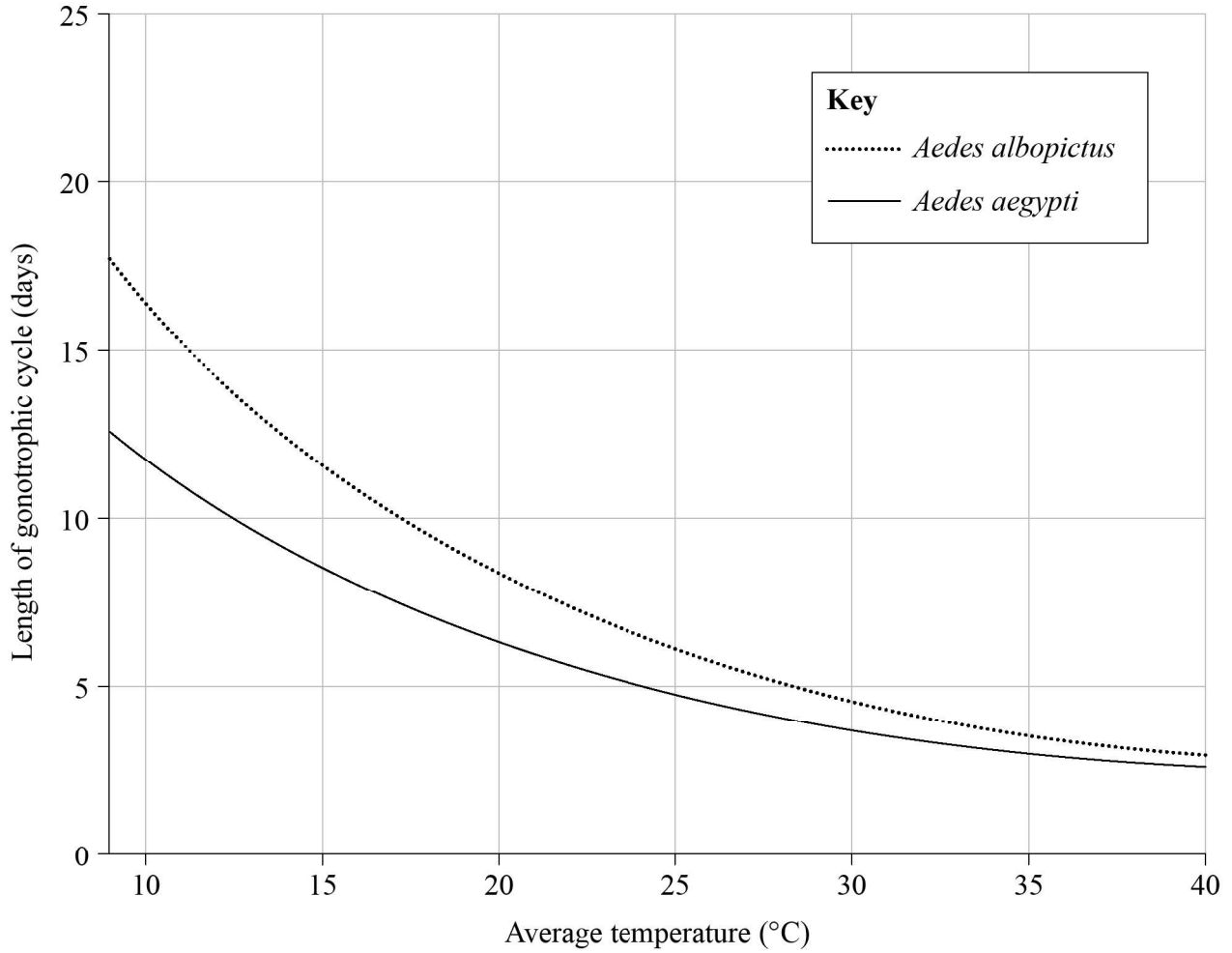
Stimulus 1

This graph shows the Southern Oscillation Index (SOI) and SOI phase between January 2010 and October 2012.



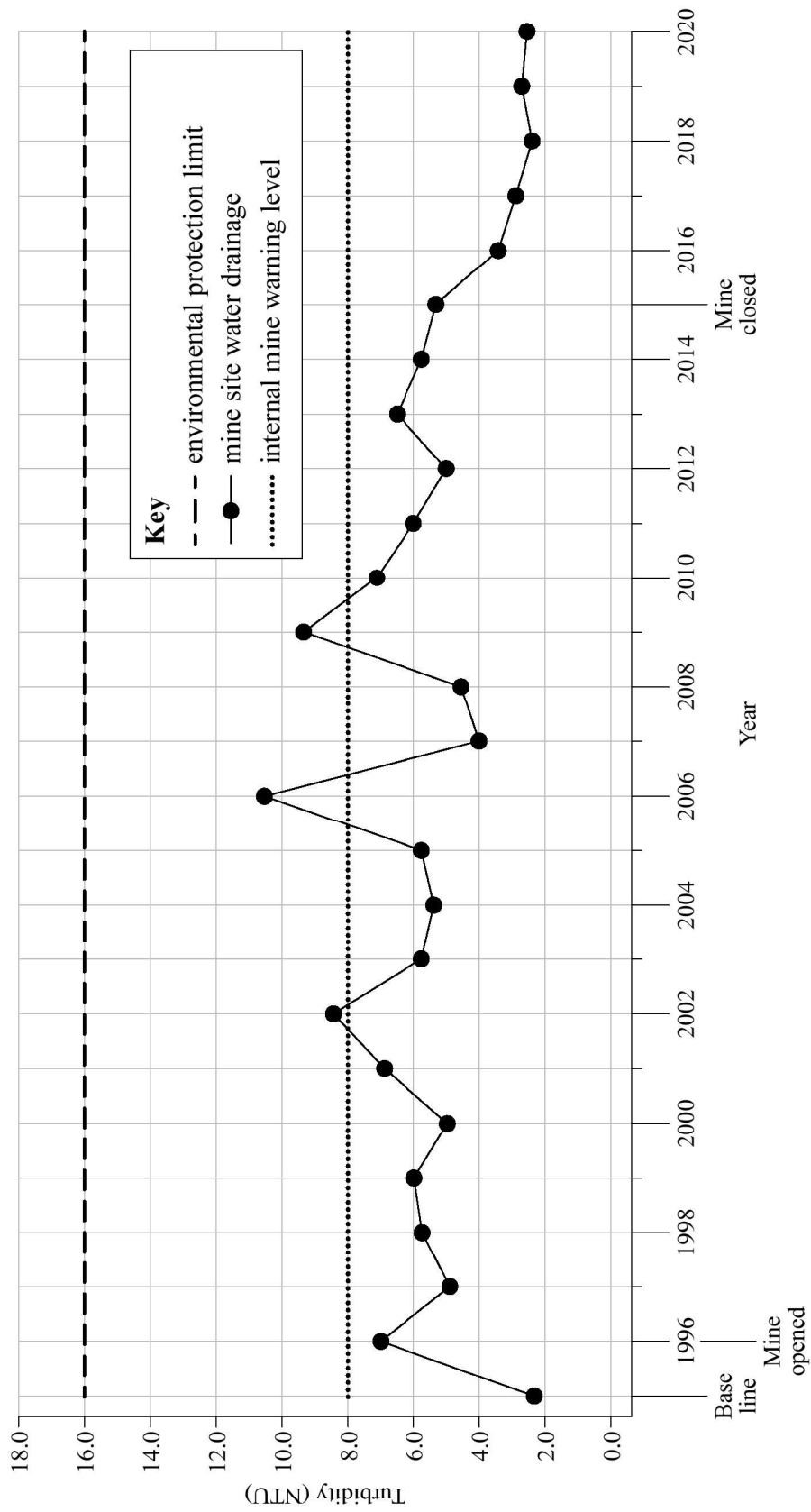
Stimulus 2

This graph shows the relationship between average temperature and length of the first gonotrophic (reproductive) cycle for *Aedes aegypti* and *Aedes albopictus*.



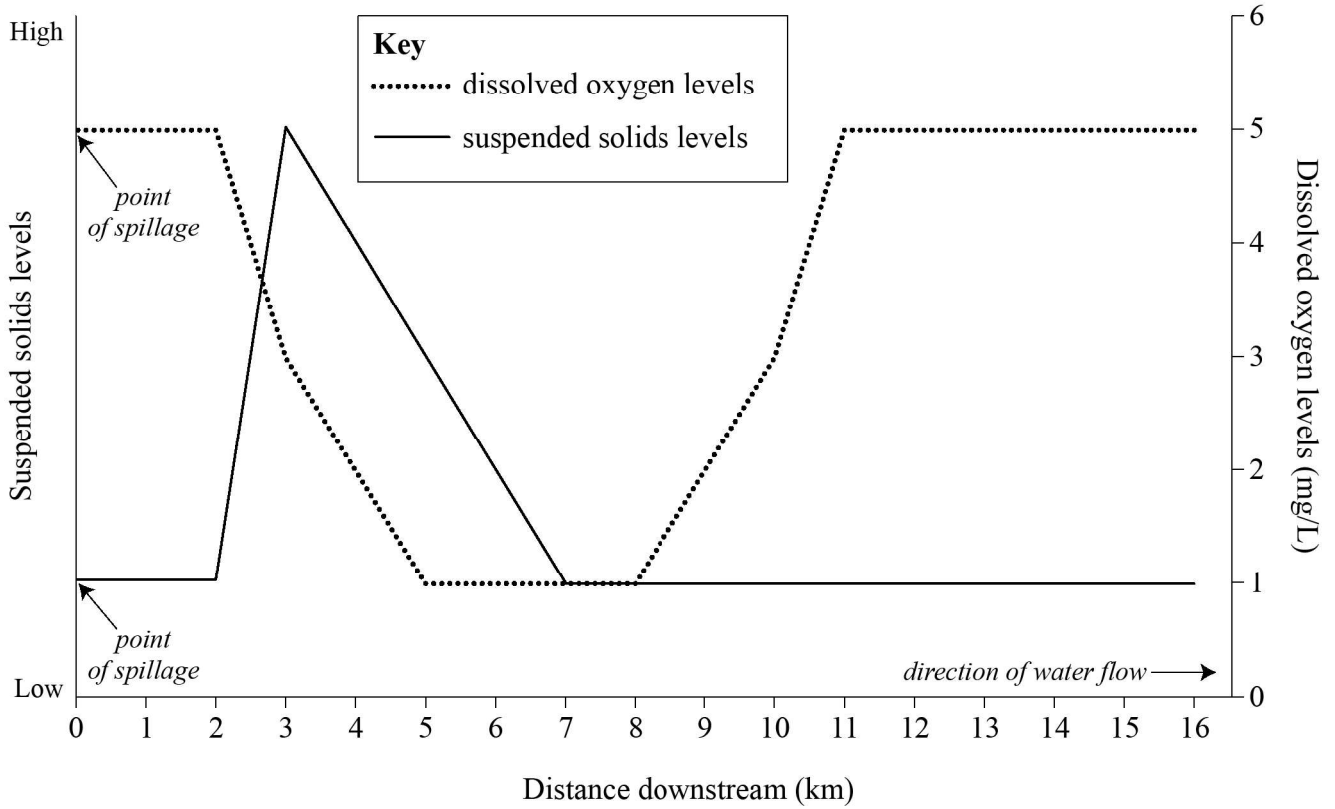
Stimulus 3

This graph shows measured values for turbidity from a river system near a mine site. The mine had an environmental protection limit of 16 NTU, which, if exceeded, would result in government intervention. The mine implemented its own intervention strategy when turbidity exceeded 8 NTU.



Stimulus 4

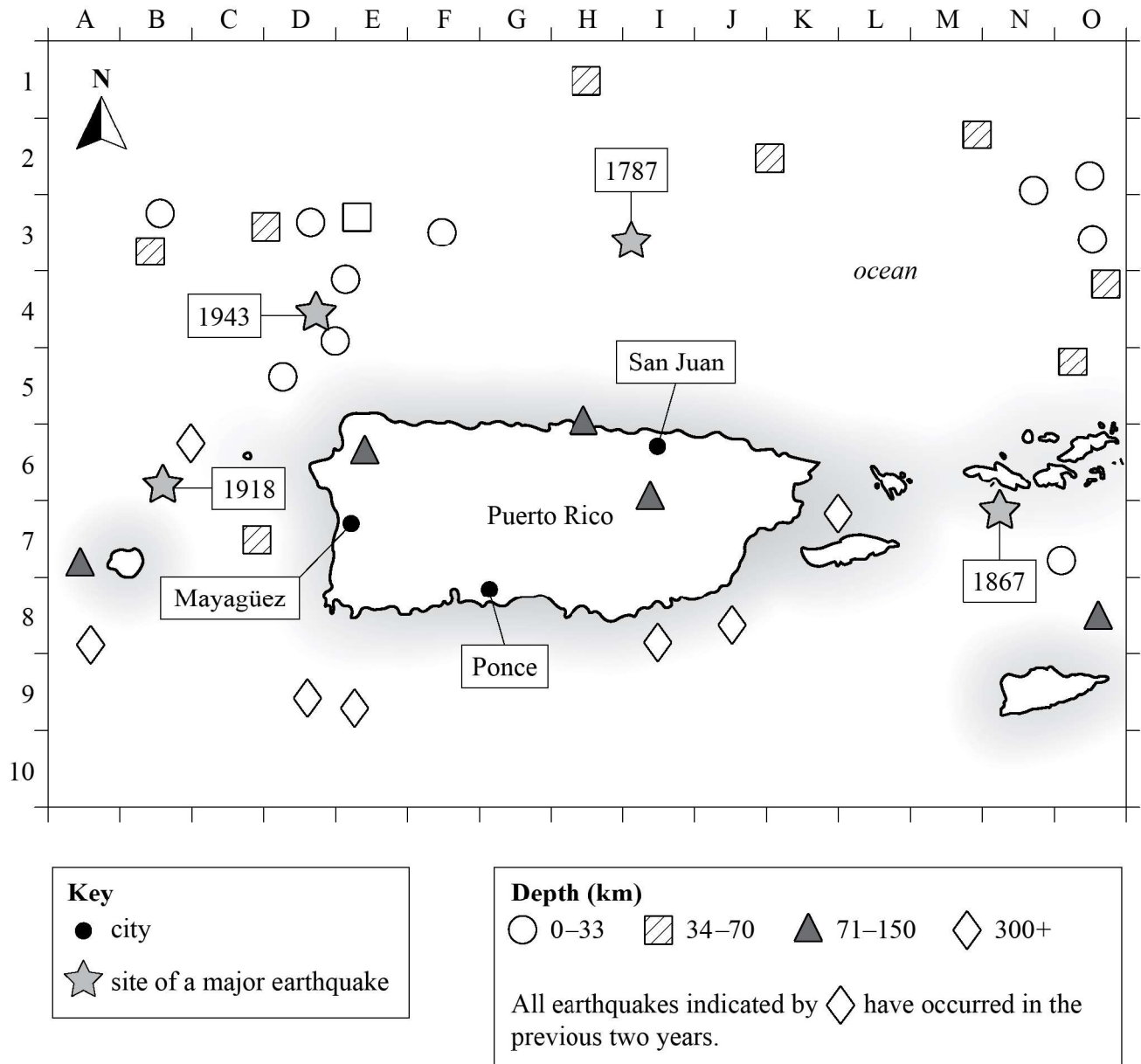
A council truck carrying sewage overturned and spilled its load near a wetland. Two weeks later, council workers took samples at different distances along the creek downstream from where the spill occurred. The results of the water analysis (dissolved oxygen and suspended solids) were recorded.



Stimulus 5

Based on a significant increase in population over recent years, the government of Puerto Rico has decided to decentralise from the capital San Juan (I6). It moved the Department of Civil Defense to the city of Ponce (G8) on the south coast of Puerto Rico, as opposed to the city of Mayagüez (E7) on the west coast. In 1918, an earthquake measuring 7.5 on the Richter Scale occurred approximately 50 km west of Puerto Rico. This earthquake resulted in a tsunami that generated a maximum run-up of 6.8 m along the adjacent coastline of Puerto Rico and killed 147 people.

This map, showing the epicentres of all major earthquakes, was considered when making the decision.



Stimulus 6

This table outlines the impact of earthquakes at different magnitudes.

Magnitude (Richter scale)	Impact
1–3	Barely noticeable, felt by a few people
3–5	Noticeable indoors, felt by almost everyone, some shaking of small objects, some damage
6–7	Felt by everyone, considerable damage to poorly built structures
7–8	Landslides, destruction of buildings with timber and masonry construction
>8	Total damage. Wide cracks in the ground and potential liquefaction

References

Stimulus 1

Adapted from The Long Paddock 2020, 2011 — *Southern Oscillation Index and 'SOI Phase'* in 'SOI monthly graphs', www.longpaddock.qld.gov.au/soi/monthly-graphs. Used under Creative Commons Attribution 4.0 <https://creativecommons.org/licenses/by/4.0/>

Stimulus 2

Adapted from Brady, O J, Golding, N, Pigott, D M, Kraemer, M U G, Messina, J P, Reiner, R C, Scott, T W, Smith, D L, Gething, P W & Hay, S I 2014, *Figure 2: Relationship between temperature and length of the first gonotrophic cycle for Ae. aegypti and Ae. albopictus* in 'Global temperature constraints on Aedes aegypti and Ae. albopictus persistence and competence for dengue virus transmission', *Parasites & Vectors*, vol. 7, article no. 338, <https://doi.org/10.1186/1756-3305-7-338>. Available under a Creative Commons Attribution Licence 4.0 (<http://creativecommons.org/licenses/by/4.0>)

Stimulus 5

Derived from Cheadle, M 2015, *Figure 8: Map showing the epicenters of all the magnitude 5 and greater earthquakes around Puerto Rico for the last 100 years* in 'Studying geology underwater: Landslides, tsunamis, and earthquakes', Ocean Exploration and Research, <https://oceanexplorer.noaa.gov/oceanos/explorations/ex1502/logs/apr27/apr27.html>.



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