

EXAM 6 – CANADA, FALL 2018

19. (3 points)

The following Probable Maximum Loss (PML) outputs from an earthquake model are available as at December 31, 2017. All amounts are in millions of dollars.

Retention Period	Eastern Canada	Western Canada
100 years	50	200
250 years	150	400
500 years	600	800

a. (1 point)

Assuming that the company uses the phase-in formula, calculate the MCT Earthquake Reserves as at December 31, 2017.

b. (2 points)

Describe four key principles identified by Office of the Superintendent of Financial Institutions (OSFI) to assist insurers in developing prudent approaches to managing earthquake risk.

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SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 19	
TOTAL POINT VALUE: 3	LEARNING OBJECTIVE(S): C1, D1
SAMPLE ANSWERS	
Part a: 1 point	
<p><i>Sample</i></p> <p>East PML 420 = $(420-250)/(500-250) \times 600 + (500-420)/(500-250) \times 150 = 456$ West PML 420 = $(420-250)/(500-250) \times 800 \times (500-420)/(500-250) \times 400 = 672$ Countrywide PML 500 = $\sqrt[1.5]{600^{1.5} + 800^{1.5}} = 1116.85$ Countrywide PML 2017 = $(2017-2014)/8 \times 1116.85 + (2022-2017)/8 \times \max(456, 672) = 838.82$ Assuming financial resources and earthquake premium reserve both are 0, Earthquake reserve = $838.82 \times 1.25 = 1048.52$</p>	
Part b: 2 points	
<p><i>Sample answers (any four of the following):</i></p> <ul style="list-style-type: none"> • Earthquake Exposure Risk Management: insurers should have a sound and comprehensive earthquake exposure risk management policy that is subject to oversight by the Board of Directors and is implemented by senior management. • Earthquake exposure Data: earthquake exposure data needs to be appropriately captured and regularly tested for consistency, accuracy and completeness. • Earthquake models: Earthquake models should be used with a sound knowledge of their underlying assumptions and methodologies, as well as with a high degree of caution that reflects the significant uncertainty in such estimates. • PML estimates: PML estimates should properly reflect the total expected ultimate cost to the insurer, including considerations for data quality, non-modelled exposures, model uncertainty and exposures to multiple regions. • Financial resources and Contingency plan: Insurers need to ensure that they have an adequate level of financial resources and appropriate contingency plans to successfully manage through a major earthquake. 	
EXAMINER'S REPORT	
Candidates were expected to know the components of the earthquake reserve calculation, as well as understand key principles behind prudent management of earthquake risk.	
Part a	
Candidates were expected to know the steps in the calculation of the earthquake PML including the phase-in PML.	
As financial resources and earthquake premium reserve were not provided in the question, full credit was awarded to answers that calculated the Countrywide PML 2017 correctly.	
Common errors included:	
<ul style="list-style-type: none"> • Interpolating the PML 420 incorrectly • Only calculating the West PML without stating that it is larger than East PML • Interpolating the Countrywide PML 2017 incorrectly 	

SAMPLE ANSWERS AND EXAMINER'S REPORT

Part b

Candidates were expected to provide the key principles of managing earthquake risk.

A common error was:

- Providing two answers that fell in the same category. For example, “have adequately trained staff to run the model” and “have a sound knowledge of key assumptions underlying the model.”