2. (2 points)

Given the following information:

Rate Change Effective Date	Overall Rate Change
July 1, 2013	5%
October 1, 2015	2%
October 1, 2016	-4%

Calendar Year	Earned Premium ($000)	Earned Premium ($000) at Current Rate Level
2014	15,000	14,775
2015	18,000	17,622

- 2016 Earned Premium = $22,000,000.
- 2014 through 2016 combined projected ultimate loss and LAE = $40,000,000.
- Selected annual premium trend = 2%.
- Fixed expense provision = 8%.
- Variable expense provision = 20%.
- Target underwriting profit provision = 5%.
- All policies are annual.
- Rates are to be in effect for one year.
- The rate revision is planned to be effective October 1, 2017.

a. (1.5 points)

Calculate the projected earned premium at current rate level for 2014 through 2016.

b. (0.5 point)

Calculate the indicated rate change.

CONTINUED ON NEXT PAGE

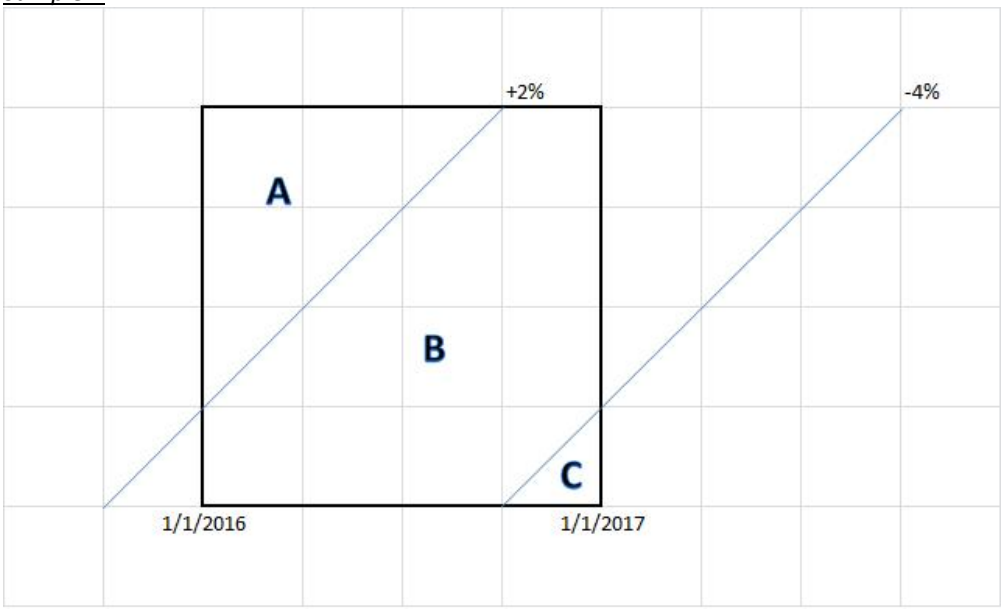
QUESTION 2

TOTAL POINT VALUE: 2 | **LEARNING OBJECTIVE(S): A2, A5**

SAMPLE ANSWERS

Part a: 1.5 points

Sample 1



CY16 Rate Level Calculations:

Area	*Area/Weight*	*Rate Level*
A	$(3/4)^2 * (1/2) = 9/32 = 0.28125$	1.05
B	1 – A – C = 1 - 0.28125 - 0.03125 = 11/16 = 0.6875	1.05*1.02 = 1.071
C	$(1/4)^2 * (1/2) = 1/32 = 0.03125$	1.05*1.02*0.96 = 1.02816

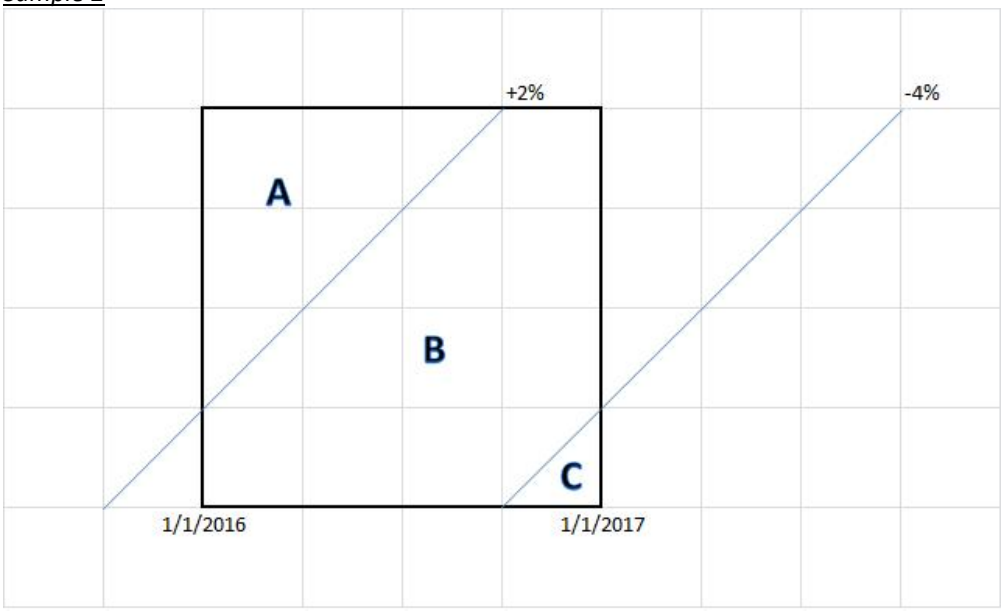
CY16 Average Rate Level (ARL) = 0.28125*1.05 + 0.6875*1.071 + 0.03125*1.02816 = 1.063755
CY16 Current Rate Level (CRL) = 1.05*1.02*0.96 = 1.02816
CY16 On-Level Factor (OLF) = CY16 CRL / CY16 ARL = 1.02816 / 1.063755 = 0.966538

Projected Premium Calculations:

CY	*EP @ CRL (or OLEP)*	*Trend*	*Proj EP @ CRL*
14	14,775 (*given*)	$1.02^{4.25} = 1.087804$	16,072
15	17,622 (*given*)	$1.02^{3.25} = 1.066475$	18,793
16	22,000 * CY16 OLF = 22,000 * 0.966538 = 22,264	$1.02^{2.25} = 1.045563$	22,233
Tot			57,098 (in 000s)

Notes:
Proj EP @ CRL = EP @ CRL * Trend (*ex. 14,775 * $1.02^{4.25}$ = 16,072*)
Trend period from 7/1/CY to 10/1/18

Sample 2



CY16 Rate Level Calculations:

Area	***Area/Weight***	***Rate Level***
A	$(9)^2$ * (1/2) / 144 = 9/32 = 0.28125	1.00
B	1 – A – C = 1 - 0.28125 - 0.03125 = 11/16 = 0.6875	1.02
C	$(3)^2$ * (1/2) / 144 = 1/32 = 0.03125	1.02*0.96 = 0.9792

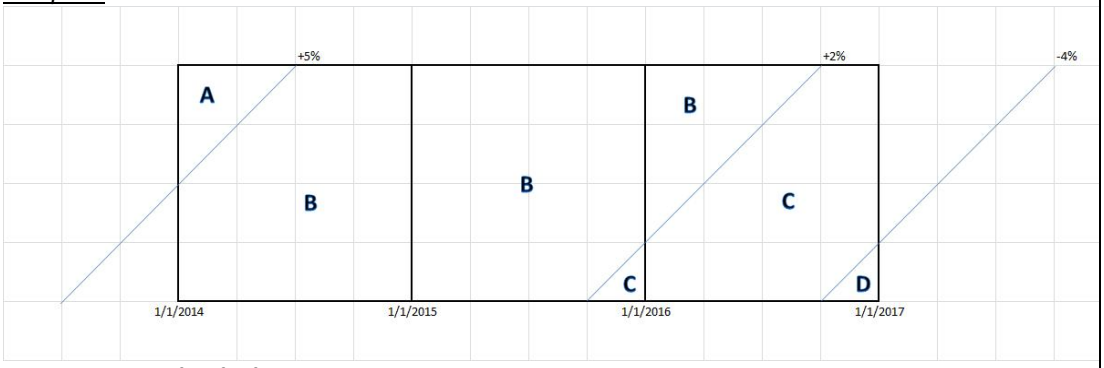
CY16 Average Rate Level (ARL) = 0.28125*1.00 + 0.6875*1.02 + 0.03125*0.9792 = 1.0131
CY16 Current Rate Level (CRL) = 1.02*0.96 = 0.9792
CY16 On-Level Factor (OLF) = CY16 CRL / CY16 ARL = 0.9792 / 1.0131 = 0.966538

Projected Premium Calculations:

CY	***EP @ CRL (or OLEP)***	***Trend***	***Proj EP @ CRL***
14	14,775 (*given*)	$1.02^{4.25}$ = 1.087804	16,072
15	17,622 (*given*)	$1.02^{3.25}$ = 1.066475	18,793
16	22,000 * CY16 OLF = 22,000 * 0.966538 = 22,264	$1.02^{2.25}$ = 1.045563	22,233
Tot			57,098 (in 000s)

Notes:
Proj EP @ CRL = EP @ CRL * Trend (*ex. 14,775 * $1.02^{4.25}$ = 16,072*)
Trend period from 7/1/CY to 10/1/18

Sample 3



CY14 Rate Level Calculations:

Area	***Area/Weight***	***Rate Level***
A	$(1/2)^2 * (1/2) = 1/8 = 0.125$	1.00
B	1 – A = 1 - 0.125 = 7/8 = 0.875	1.05

CY15 Rate Level Calculations:

Area	***Area/Weight***	***Rate Level***
B	1 – C = 1 - 0.03125 = 31/32 = 0.96875	1.05
C	$(1/4)^2 * (1/2) = 1/32 = 0.03125$	1.05*1.02 = 1.071

CY16 Rate Level Calculations:

Area	***Area/Weight***	***Rate Level***
B	$(3/4)^2 * (1/2) = 9/32 = 0.28125$	1.05
C	1 – A – C = 1 - 0.28125 - 0.03125 = 11/16 = 0.6875	1.05*1.02 = 1.071
D	$(1/4)^2 * (1/2) = 1/32 = 0.03125$	1.05*1.02*0.96 = 1.02816

Current Rate Level (CRL) = 1.05*1.02*0.96 = 1.02816

CY14 Average Rate Level (ARL) = 0.125*1.00 + 0.875*1.05 = 1.04375
CY15 Average Rate Level (ARL) = 0.96875*1.05 + 0.03125*1.071 = 1.05065625
CY16 Average Rate Level (ARL) = 0.28125*1.05 + 0.6875*1.071 + 0.03125*1.02816 = 1.063755

CY14 On-Level Factor (OLF) = CY16 CRL / CY16 ARL = 1.02816 / 1.04375 = 0.985063
CY15 On-Level Factor (OLF) = CY16 CRL / CY16 ARL = 1.02816 / 1.05065625 = 0.978588
CY16 On-Level Factor (OLF) = CY16 CRL / CY16 ARL = 1.02816 / 1.063755 = 0.966538

Projected Premium Calculations:

CY	*EP*	*EP @ CRL (or OLEP)*	*Trend*	*Proj EP @ CRL*
14	15,000	15,000*0.985063 = 14,776	$1.02^{4.25}$ = 1.087804	16,073
15	18,000	18,000*0.978588 = 17,615	$1.02^{3.25}$ = 1.066475	18,786
16	22,000	22,000*0.966538 = 22,264	$1.02^{2.25}$ = 1.045563	22,233
Tot				57,092 (in 000s)

Notes:
EP @ CRL = EP * OLF (*ex. 15,000 * 0.985063 = 14,776*)
Proj EP @ CRL = EP @ CRL * Trend (*ex. 14,775 * $1.02^{4.25}$ = 16,072*)
Trend period from 7/1/CY to 10/1/18

Part b: 0.5 point

Projected Loss Ratio = Projected Ultimate Loss & LAE / Projected EP @ CRL
= 40,000,000 / 57,098,000 = 0.70055

Indicated Rate Change = (LR + F) / (1 – V – Q) – 1
= (0.70055 + 0.08) / (1 – 0.2 – 0.05) – 1
= 0.0407 (or 4.07%)

EXAMINER'S REPORT

Candidates were expected to understand how to utilize each piece of the information provided to bring premiums to current rate level (via on-leveling) and apply trend to calculate projected premium. As a final step, the candidate is expected to determine the indicated rate change as a result of the projected premium.

Part a

Candidates were expected to understand the impacts of the historical rate changes on the calendar years and determine the average rate level for CY16. This required candidates to utilize the parallelogram method. Candidates needed to display an understanding of utilizing the average rate level and the current rate level to bring earned premium for CY16 to current rate level. Candidates could utilize a similar approach for CY14 and CY15, though the earned premium at current rate level for each was provided in the question instructions.

Candidates were then expected to understand how the annual premium trend would impact each of the calendar years and apply trend appropriately to project the earned premium at current rate level to the projection period where rates would be in effect.

Common errors included:

- Trending all earned premium grouped together across the CYs or not correctly understanding the starting and/or ending points in the one-step trend. Sometimes a

two-step trend was applied. The most common mistake made by candidates was in the trend step.

- Failing to realize that there were two rate changes that impacted the average rate level in CY16. The 10/1/15 rate change was often ignored in building the average rate level calculation.
- Calculating weights assigned to each of the different rate levels within CY16 incorrectly.
- Calculating the on level factors for CYs 2014 and 2015 incorrectly and carrying this forward through the solution, even though the EP @ CRL was given for these years.

Part b

Candidates were expected to utilize the projected premium from part (a) to calculate the indicated rate change using a loss ratio method.

Common errors included:

- Misreading question information and applying the fixed expense provision as an LAE load (LR * 1.08 instead of LR + 0.08) in the numerator
- Applying an incorrect trend within this part (for example, applying a factor of $1.02^{1.25}$ or $1.02^{2.25}$ to the 2014-2016 total EP or EP @ CRL)