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2002 EA-2B EXAM SOLUTIONS

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2002 EA-2B Exam Solutions

These solutions were prepared based on the law as in effect at December 31, 2001.

These solutions have been compared with those produced by other technical actuaries, and they represent my best understanding of the correct way to solve these problems. As usual, it seems easy to get an answer in the correct range as long as you are not actually taking the exam!

I believe this exam was more difficult than the 2001 exam.

Revision History:

May 10, 2013	Corrected solutions for problems 17 and 28
April 5, 2010	Clarified note at end of solution for problem 2
April 21, 2009	Corrected pages 2, 4 and 5 of the solution for problem 36
April 28, 2006	Clarified solution for problem 28
May 3, 2005	Corrected solutions for problems 27 and 33
May 2, 2005	Corrected solution for problem 16
April 11, 2005	Corrected solutions for problems 2, 22, 27 and 28
December 9, 2004	Corrected solution for problem 33 (page 2)
April 29, 2004	Added clarification for solutions for problem 28 (page 2)
April 24, 2004	Corrected solutions for problems 29 and 34, added solution for problem 22, added clarifications for solutions 14 (page 3) and 28 (page 1)
November 26, 2003	Corrected solutions for problems 14 (page 2) and 28 (page 1)
May 3, 2003	Corrected pages 4 and 5 of solution for problem 36
April 30, 2003	Corrected page 1 of solution for problem 24
	Clarified pages 1-4 of solution for problem 27
	Corrected page 1 of solution for problem 34
	Corrected pages 4 and 5 of solution for problem 36
April 21, 2003	Corrected pages 1 and 3 of solution for problem 14
	Corrected pages 2 and 3 of solution for problem 38
March 9, 2003	Original solutions

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Problem 1

TRUE

IRC Section 6057(a) covers the requirement for a plan to file the Schedule SSA. In Section 6057(e), it requires the plan administrator to furnish a statement to the participant which contains information describing their vested benefit. The notification to the participant must be furnished by the date the Schedule SSA is required to be filed.

Answer is A

Problem 2

Revised 04/05/10

TRUE

In IRC Section 411(a)(4), certain periods can be disregarded in determining vesting service. IRC Section 411(a)(4)(C) allows you to ignore years of service when the employer did not maintain the plan, or a predecessor plan.

The existence of the 401(k) plan is immaterial. The question was trying to fool you into thinking the profit sharing plan was a predecessor plan.

Answer is A

The definition of a predecessor plan is in the 1.411(a) regulation, which is NOT on the EA-2B reading list:

1.411(a)-5(b)(3)(v)(B) Definition of predecessor plan. --For purposes of this section, if --

(1) An employer establishes a retirement plan (within the meaning of section 7476(d)) qualified under subchapter D of chapter 1 of the Code within the 5-year period immediately preceding or following the date another such plan terminates, and

(2) The other plan is terminated during a plan year to which this section applies, the terminated plan is a predecessor plan with respect to such other plan.

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Problem 3

FALSE

The Schedule B does not have to be filed for all defined benefit plans. It must be filed for all defined benefit plans to which IRC Section 412 applies. See IRC Section 6059(a).

In IRC Section 412(h), it lists plans that are not subject to Section 412:

- Stock bonus plans
- Profit sharing plans
- Insurance contract plans
- Governmental plans
- Certain church plans
- Plans with no employer contributions
- Certain 501(c)(8) and 501(c)(9) plans

Answer is B

Problem 4

FALSE

IRC Section 416(i) defines the term "key employee":

- Officer with compensation above 130,000
- Someone with more than 5% stock ownership
- Someone with more than 1% stock ownership and compensation above 150,000

Brown is an officer, but the compensation is too low for them to be a key employee. Brown's wife is a key employee, due to the constructive ownership rules of IRC Section 318. Under 318(a)(5)(B), Brown is not considered to own his wife's stock.

Answer is B

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Problem 5

FALSE

The extensions of time are for payments that can be deducted under 404. The timing of the deduction is based on tax years, and can be extended. The extensions have no impact on the minimum funding requirement under 412. The timing of the minimum contribution is based on plan years, and it can't be extended.

The point of this question is whether it is possible to delay the MFSA contribution farther than 8 ½ months after the end of the plan year. The answer is no - there will be a funding deficiency unless \$20,000 is paid by 09/15/2002.

Answer is B

This question could have been tested on the EA-2A exam.

Problem 6

FALSE

The stability period is the length of time that the interest rate remains level. The stability period can be a month, a plan quarter, or a plan year. The lookback month can precede the stability period by from one to five months.

See the regulation at 1.417(e)-1(d)(4).

Answer is B

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Problem 7

TRUE

IRC Section 412(c)(8) contains the requirements for retroactive plan amendments:

- 412(c)(8)(A) - amendment must be made no later than 2 ½ months after the end of the plan year (2 years after end of plan year for multiemployer plans)
- 412(c)(8)(B) - amendment can't reduce any participant's the accrued benefit as of the beginning of the plan year to which the amendment applies
- 412(c)(8)(C) - amendment can't reduce any participant's accrued benefit as of the adoption date, except to the extent required by the circumstances

Answer is A

This question could have been tested on the EA-2A exam.

Problem 8

Similar to 1999 #18

TRUE

The regulation at 1.401(a)(4)-4 contains definitions and rules for nondiscriminatory availability of benefits rights and features. 1.401(a)(4)-4(b)(2)(i) states the general rule is that any determination is “based on the current facts and circumstances with respect to the employee.” 1.401(a)(4)-4(b)(2)(ii)(A)(1) states that “any specified age and service condition with respect to an optional form of benefit or a social security supplement is disregarded in determining whether the optional form of benefit or social security supplement is currently available.” 1.401(a)(4)-4(e)(1)(i) defines an optional form to include an early retirement benefit.

Answer is A

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Problem 9

FALSE

This question tests a small detail in the definition of "participant" for PBGC premium purposes. The participant count is shown in line 13 of the Form PBGC-1. The Line 13 instructions state:

"For premium purposes, individuals who are earning or retaining credited service but with respect to whom a plan has no benefit liabilities are not counted as participants. But individuals who are earning or retaining credited service are considered to be participants for purposes of line 7 of the Form 5500, even if the plan has no benefit liabilities with respect to them."

The participant has not yet accrued a benefit under the plan. Since the plan provides a pre-retirement death benefit of 5,000 immediately upon employment, there is a benefit liability under the plan. As a result, employee Smith is counted as a participant for the Form PBGC-1.

Answer is B

Problem 10

TRUE

This question is based on IRC Section 415(b)(4)(B), which says the 10,000 floor only applies if "the employer has not at any time maintained a defined contribution plan in which the participant participated."

Employer B maintained the plan for part of a year, and then terminated the plan. For any employees who were covered under the DC plan, the 10,000 floor does not apply.

Answer is A

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Problem 11

Similar to 2001 #20

TRUE

This is covered under the definition of "Active participant reduction" at 4043.23(a)(3):
"A reportable event occurs when the number of active participants under a plan is reduced to less than 80 percent of the number of active participants at the beginning of the plan year, or to less than 75 percent of the number of active participants at the beginning of the previous plan year."

Answer is A

Problem 12

TRUE

In general, all members of a controlled group are jointly liable for anything related to a qualified plan (such as plan termination liability). The same is true for payment of PBGC premiums, minimum contributions and plan termination liability.

See 4007.12(a) Liability for single-employer premiums:

" ... Pursuant to section 4007(e) of ERISA, both the plan administrator and the contributing sponsor of a single-employer plan are liable for premium payments, and, if the contributing sponsor is a member of a controlled group, each member of the controlled group is jointly and severally liable for the required premiums ... "

Answer is A

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Problem 13

FALSE

This is a "general knowledge" question about the minimum funding standard account. There is no code section that requires you to subdivide the credit balance and track it separately for each employer. IRC Section 412(b)(7) contains some esoteric rules for multiemployer plans, but nothing that requires splitting out the results for each employer.

Answer is B

This question could have been tested on the EA-2A exam.

The definition of a rate group is that it consists of all employees with both a normal accrual rate (NAR) and a most valuable accrual rate (MVAR) that are equal to or exceed those rates for a given HCE.

Under the 401(a)(4) test, if a rate group's ratio percentage is less than 70%, the rate group must pass the average benefits percentage test of 1.410(b)-2(b)(3). This test has two parts, just like the ABP test in 410(b)(2)(A). The first part of the test is the non-discriminatory classification test, and the second part is the average benefits percentage test. All rate groups are deemed to satisfy the reasonable classification requirement. In lieu of the facts-and-circumstances requirement, each rate group's ratio percentage must equal or exceed the lesser of

- The ratio percentage for the plan, or
- The midpoint between the safe and unsafe harbor percentages for the testing group

Here are the steps required to work this problem:

1. Calculate the non-highly compensated concentration percentage
2. Calculate the ratio percentage test for the plan
3. Identify the safe harbor and unsafe harbor percentages from the table
4. Calculate the lesser of step 2, and the midpoint between the safe and unsafe harbors
5. Construct the rate groups which correspond to each of the three groups of HCEs
6. Calculate a ratio percentage test for each rate group which will contain NHCEs from Group 3
7. Solve for the minimum number of NHCEs in Group 3 which will produce a ratio test that equals or exceeds the value from step 4
8. Verify that the entire testing group passes the average benefits percentage test

Step 1

The non-highly compensated concentration percentage (NHCCP) is defined under the regulations at §1.410(b)-4(c)(4)(iii) as the ratio of non-excludable NHCEs to total non-excludable employees. The number of non-participants (if any) should be included in the total non-excludable. The total number of HCEs is 125, and the total number of NHCEs is 300. The NHCCP is $300 / (300 + 125) = 70.59\%$, which should be truncated to 70%.

Step 2

The ratio percentage for the plan is calculated as the ratio of a NHCE value divided by the HCE value. Each of the values is itself the ratio of the number of employees benefiting under the plan divided by the total number of non-excludable. Since all employees are benefiting, the ratio percentage is 100%:

$$100\% = [300 / 300] / [125 / 125]$$

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Problem 14 - Page 2

Revised 11/26/03

Step 3

Based on the NHCCP of 70%, the safe harbor percentage is 42.5%, and the unsafe harbor percentage is 32.5%. The midpoint between the safe and unsafe harbors is 37.5%.

Step 4

The lesser of the ratio percentage of 100% and the midpoint between the safe and unsafe harbors is 37.5%.

Step 5

The data given has three groups of HCEs. Since the HCEs have different values for the MVAR and NAR, there are three rate groups. Each rate group consists of all the HCEs and NHCEs that have both the most valuable accrual rate (MVAR) and the normal accrual rate (NAR) greater than or equal to those values for any particular HCE.

	HCEs	NHCEs	NAR	MVAR	From which groups?
Rate Group A	125	300	1.25%	2.20%	1-4 and 5-7
Rate Group B	90	Y + Z	1.50%	2.50%	2, 3, 6 and 7
Rate Group C	50	Z	1.70%	2.60%	3 and 7

Step 6

Only two of the three rate groups will contain the Z NHCEs from Group 3. The ratio percentages for the rate groups are calculated as follows:

$$\begin{aligned}\text{Rate Group A} & \quad [300 / 300] \quad / \quad [125 / 125] = 100\% \\ \text{Rate Group B:} & \quad [(Y + Z) / 300] \quad / \quad [90 / 125] \\ \text{Rate Group C:} & \quad [Z / 300] \quad / \quad [50 / 125]\end{aligned}$$

Step 7

Now you can solve for the value of Z that will produce the desired ratio percentage result of 37.5%:

$$\begin{aligned}\text{Rate Group B:} & \quad [(Y + Z) / 300] \quad / \quad [90 / 125] \geq 37.5\% \\ \text{Rate Group C:} & \quad [Z / 300] \quad / \quad [50 / 125] \geq 37.5\%\end{aligned}$$

You should start with Rate Group C, so you can solve for the value of Z:

$$\begin{aligned}Z / 300 & \geq [.375][50 / 125] \\ Z & \geq [300][.375][50 / 125] \\ Z & \geq 45\end{aligned}$$

Problem 14 - Page 3**Revised 04/24/04**

You should also think about Rate Group B. Does it matter if you can show that a lower (or higher) value of Z would allow Rate Group B to produce the desired ratio percentage?

Since the problem asks for the minimum value of Z, you really don't care. The previous calculations show that Z must be at least 45 for Rate Group C to pass the ratio percentage test.

Step 8

The final step is to verify that the entire testing group passes the average benefits percentage test. This is necessary, otherwise each rate group's ratio percentage would have to be at least 70% in order to pass the general test under IRC Section 401(a)(4).

Since you are given the result of the average benefits percentage test as 95%, no further calculations are necessary.

Answer is B**NOTES:**

1. In this problem you should not think about the option to group accrual rates. I interpret the data as given to have already done this, based on large numbers of employees who have identical values for the NAR and MVAR.
2. If you are not convinced about the logic at the end of step 7, here is more detail. You have to make an assumption about the value of Y to derive the value of Z for Rate Group B. You are told that $X + Y + Z + 15 = 300$. You can assign minimum values of 1.0 for both X and Y. Since Z is at least 45, the maximum value for Y would be 239, which equals $300 - 15 - 45 - 1$.

If the Rate Group B calculations produce a smaller value for Z, it is immaterial. Z must be at least 45 for Rate Group C to pass 401(a)(4). Now solve for the "worst case" value:

Rate Group B:

$$\begin{aligned} [(Y + Z) / 300] / [90 / 125] &\geq 37.5\% \\ (1+Z) / 300 &\geq [.375][90 / 125] \\ Z &\geq [300][.375][90 / 125] - 1 \\ Z &\geq 80 \end{aligned}$$

As expected, this value is greater than 45. But it is likely that the value of Y could exceed 36, in which case the required value of Z would be less than 45.

As described above, the key point is that the question asks for the minimum value of Z for the plan to pass the 401(a)(4) general test. You previously calculated this as 45.

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Problem 15 - Page 1

Similar to 1999 #27

This is a typical §415 problem. The key point of the problem is the calculation of the actuarial reduction to the §415 dollar limit prior to age 62.

Starting in 1997, earnings under §415 is defined as total compensation (not taxable). Earnings under §415 is not subject to the §401(a)(17) limit of 150,000.

At 12/31/02

Age	60
Service	10 years
Participation	10 years

Birth date	12/31/42
Hire date	12/31/92
Effective date	01/01/93
Early retirement age	60
Normal retirement age	65

$$\text{Accrued benefit at age 60} = 195,000 * 100\%$$

$$\text{Early retirement benefit at age 60} = 146,250 = 195,000 * (1 - 5\%)$$

The §415(b)(1)(B) compensation limit is reduced when service is less than ten years.

$$\text{Age 60 100\% 3 year comp. §415 limit} = 195,000 * (10/10)$$

Under §415(b)(1)(A), the dollar limit is reduced when participation is less than ten years.

$$\text{§415 dollar limit during 2002} = 160,000 \text{ at age 62} * (10/10)$$

§415(b)(2)(E)(i) says to use the greater of 5% and the interest rate specified in the plan to reduce the §415 dollar limit prior to age 62. The examples in Revenue Ruling 98-1 clarify that the §415 dollar limit is reduced using the lower of the factors calculated based on the mandated mortality and interest rate, and plan basis for optional forms.

You are not given the “N/N” factors, since the 2002 factor table only shows \ddot{a}_x values. You should use the $(1+i) * (\ddot{a}_x / \ddot{a}_y)$ factors both on the plan basis and on the mandated basis. This is consistent with the definition of the death benefit. With a death benefit equal to the present value of the accrued benefit, there is no risk of forfeiting the benefit, and there is NO mortality risk involved. The actuarial reduction prior to age 62 is calculated using the ratio of the \ddot{a}_x values, which excludes the probability of death:

$$\begin{aligned} \text{Actuarial reduction from 62 to 60} &= (1.05)^{-2} * \left(\ddot{a}_{62}^{(12)} / \ddot{a}_{60}^{(12)} \right) \\ \text{(Mandated basis 5\% app. mortality)} &= (1.05)^{-2} * (12.46 / 13.04) \\ &= .8667 \end{aligned}$$

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Problem 15 - Page 2

One detail in this problem is the definition of the reduction from age 62 to age 60 on the plan's optional form basis. In this problem, no basis is specified for the factors. You are told that the reduction is 5% per year before age 65. The example in Q-7 of Revenue Ruling 98-1 calculates the actuarial reduction on the plan basis as the ratio of the plan's "tabular" reduction factor at the early retirement age to the factor at age 62.

$$\begin{aligned}\text{Actuarial reduction from 62 to 60} &= \text{ERF}_{60} / \text{ERF}_{62} \\ (\text{plan "tabular" basis}) &= [1-.05(5)] / [1-.05(3)] \\ &= .8824\end{aligned}$$

$$\begin{aligned}\$415 \text{ dollar limit at age 60} &= 160,000 * \text{lesser of } [.8667 \text{ or } .8824] \\ &= 138,670\end{aligned}$$

Smith's plan benefit of 146,250 is limited to the lesser of the compensation limit of 195,000 and the dollar limit of 138,670. The final benefit payable in 2002 is 138,670.

Answer is D

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Problem 16 - Page 1

Revised 05/02/05

This is not a typical §415 problem. It is unusual to have late retirement problems with §415 limits. The key point of the problem is the calculation of the actuarial increase in the §415 dollar limit after age 65. Another point is the adjustment of the §415 dollar limit based on less than 10 years of participation.

At 02/01/02

Age	70
Service	12 years
Participation	0 years

At 02/01/97

Age	65
Service	7 years
Participation	N/A

Birth date	02/01/32
Hire date	02/01/90
Effective date	01/01/02
Late retirement age	70
Normal retirement age	65

There are two calculations you should make to determine the late retirement benefit. Based on IRS Notices 88-25 and 88-126, the plan must provide for benefit accruals past NRA. The late retirement benefit must be the greater of the actuarially increased benefit at NRA, and the late retirement benefit based on continued accruals past NRA.

$$\begin{aligned}\text{Accrued benefit at age 70} &= 35,000 * 10\% * 12 \\ &= 42,000\end{aligned}$$

$$\begin{aligned}\text{Accrued benefit at age 65} &= 35,000 * 10\% * 7 \\ &= 24,500\end{aligned}$$

You are not given the “N/N” factors, since the 2002 factor table only shows \ddot{a}_x values. You should use the $(1+i)^t (\ddot{a}_x / \ddot{a}_y)$ factors both on the plan basis and on the mandated basis.

This calculation of the actuarial increase factor is lower than it would be using the “N/N” factors. This is due to the fact the participant is covered by a death benefit during the period after normal retirement age. If there were no death benefit at all, then there would be a risk of forfeiting the benefit. In that case, the late retirement actuarial increase should be calculated using the “N/N” factors.

$$\begin{aligned}\text{Actuarial increase from 65 to 70} &= (1.055)^5 * (\ddot{a}_{65}^{(12)} / \ddot{a}_{70}^{(12)}) \\ \text{(Plan basis 5.5\% app. mortality)} &= (1.055)^5 * (11.07 / 9.57) = 1.5118\end{aligned}$$

$$\begin{aligned}\text{Late retirement benefit at age 70} &= 37,039 = 24,500 * (1.5118) \\ \text{Final plan benefit at age 70} &= 42,000 = \text{greater of } 42,000 \text{ and } 37,039\end{aligned}$$

The §415(b)(1)(B) compensation limit is reduced when service is less than ten years. This produces a lower benefit than the plan benefit:

$$\text{Age 70 100\% 3 year comp. §415 limit} = 35,000 * (10/10)$$

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Problem 16 - Page 2

Revised 05/02/05

Under §415(b)(1)(A), the dollar limit is reduced when participation is less than ten years. In §415(b)(5)(C), it states that the pro-rata reduction would never be less than 1/10:

$$\text{\$415 dollar limit during 2002} = 16,000 \text{ at age 65} = 160,000 * (1/10)$$

§415(b)(2)(E)(i) says to use the lesser of 5% and the interest rate specified in the plan to increase the §415 dollar limit prior after age 65. The examples in Revenue Ruling 98-1 clarify that the §415 dollar limit is increased using the lower of the factors calculated based on the mandated mortality and interest rate, and plan basis for optional forms.

As described earlier, you should use the $(1+i)^x (\ddot{a}_x / \ddot{a}_y)$ factors both on the plan basis and on the mandated basis.

$$\begin{aligned} \text{Actuarial increase from 65 to 70} &= (1.055)^5 * (\ddot{a}_{65}^{(12)} / \ddot{a}_{70}^{(12)}) && \text{(at 5.5\%)} \\ \text{(Plan basis 5.5\% app. mortality)} &= (1.055)^5 * (11.07 / 9.57) \\ &= 1.5118 \end{aligned}$$

$$\begin{aligned} \text{Actuarial increase from 65 to 70} &= (1.050)^5 * (\ddot{a}_{65}^{(12)} / \ddot{a}_{70}^{(12)}) && \text{(at 5.0\%)} \\ \text{(Mandated basis 5\% app. mortality)} &= (1.050)^5 * (11.53 / 9.91) \\ &= 1.4849 \end{aligned}$$

$$\begin{aligned} \text{\$415 dollar limit at age 70} &= 16,000 * \text{lesser of } [1.5118 \text{ or } 1.4849] \\ &= 23,759 \end{aligned}$$

Smith's plan benefit of 42,000 is limited to the lesser of the compensation limit of 35,000 and the dollar limit of 23,759. The final benefit payable in 2002 is 23,759.

Answer is B

Assume you have a plan that does not increase benefits for late retirement. In that case, there is no increase in the §415 dollar limit after NRA. This is based on the lower of
(i) the factors using the mandated mortality and interest rate, and
(ii) the plan actuarial increase factors, which equal 1.00 for all ages above NRA.

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Problem 17

Similar to 1999 #42

Revised 05/10/13

In general, the Top Heavy determination date is the last day of the preceding plan year. An exception to this is the first plan year, when the determination date is the last day of the first plan year. For this problem the determination date is 12/31/2001.

Based on questions T-24 and T-25 of the 1.416 regulation, the present value of accrued benefits for the DB plan (or account balance for the DC plan) is calculated as of the valuation date in the 12 month period ending on the determination date. You should use the 85,000 PVAB as of the 12/31/2001 valuation date.

You should add together the present value of vested and non-vested accrued benefits and the account balances as of that date for all participants and the key employees. The amounts should exclude values for terminated employees who have not been employed in the 12 months ending on the determination date, or values for former key employees. Since Smith terminated within 2001, they are included in the Top Heavy determination.

These amounts should include distributions (including benefit payments) within the 12 months ending on the determination date. These amounts should also include any in-service distributions within the 5 years ending on the determination date. This is the key point to this problem - to see if you knew that EGTRRA changed these rules in 2001.

Smith reached normal retirement age on 01/01/1995, and has been receiving in-service distributions since then. Their PVAB used for the Top heavy determination is the sum of five years of in-service distributions (1997 to 2001) plus the 12/31/2001 PVAB:

$$185,000 = 5(20,000) + 85,000$$

Answer is D

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Problem 18

The key point of this problem is whether you know how the RPA '94 change in the §417(e) minimum lump sum rules relates to §411(d)(6). §411(d)(6) contains a prohibition against decreases in the accrued benefit. When the minimum lump sum rules changed, the net effect could have decreased the benefit payable as a lump sum.

The 1.417(e)-1 regulation requires grandfathering of lump sum benefits using the pre-RPA '94 assumptions in certain cases. In this problem, the plan was not using the PBGC rates prior to RPA '94. In such a plan, distributions can not be less than those determined based on the accrued benefit at the effective date, based on the pre-amendment assumptions, and the participant's age at the annuity starting date.

You need to calculate the accrued benefit at 12/31/1999. You also must calculate the lump sum described in the previous paragraph, which will be applied as a minimum floor to the lump sum under the current plan provisions.

At 12/31/1999

Age	52
Service	9 years
Benefit service	9 years
Accrued benefit	$2\% \times 9 \times 100,000$ $= 18,000$

At 12/31/2002

Age	55
Service	12 years
Benefit service	10 years limited
Accrued benefit	$2\% \times 10 \times 100,000$ $= 20,000$

The lump sum based on the accrued benefit is calculated using the applicable interest rate and applicable mortality table. The age 55 annuity factor at 5.5% and applicable mortality is 13.63:

$$12/31/02 \text{ lump sum} = 272,600 = 20,000(13.63)$$

You also need to compare the grandfathered lump sum, based on the accrued benefit at the 12/31/99 effective date, the pre-amendment assumptions, and the participant's age at the annuity starting date. The age 55 annuity factor at 5.0% and 1983 IAM female mortality is 15.32:

$$12/31/02 \text{ grandfathered lump sum} = 275,760 = 18,000(15.32)$$

The final lump sum is the greater of the two values, or 275,760.

Answer is C

NOTE:

You should at least think about the 415 limits. After you actuarially reduce the 160,000 limit at age 62, the 415 limit at age 55 will still be larger than 24,000, and it will not apply.

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Problem 19

Similar to 1999 #48

IRC §414(l)(2) contains provisions for allocating assets to spun off plans when the assets exceed the present value of accrued benefits on a termination basis, and when the spun off plans are members of the same controlled group. Since the plan sponsor continues to maintain both plans B and C, they remain members of the same controlled group.

You must allocate the "applicable percentage" of the "excess assets" to each spun off plan. The "excess assets" equal the excess of the market value of assets over the present value of accrued benefits on a termination basis. In this problem, the excess assets equal $300,000 - 250,000 = 50,000$.

The "applicable percentage" is the ratio for a spun off plan to the total (for the original plan) of the excess, if any, of (I) the lesser of 165% of Current Liability, or 100% of normal cost plus accrued liability, over (II) the present value of accrued benefits on a termination basis. 165% is the 2002 value to be used in determining the Full Funding Limitation based on current liability.

Market value Allocation:		Total		
Description of item		Plan A	Plan B	Plan C
(1)	100% of current liability	200,000	125,000	75,000
(2)	Accrued liability (including NC)	280,000	180,000	100,000
(3)	Liability component of FFL, lesser of 165% CL or EAN AL	280,000	180,000	100,000
(4)	PV of AB on termination basis	250,000	160,000	90,000
(5)	Excess of (3) over (4)	30,000	20,000	10,000
(6)	Applicable percentage	100%	66.67%	33.33%
(7)	Market value of assets	300,000		
(8)	Allocated excess assets	50,000	33,333	16,667
(9)	Total allocated assets (4)+(8)	300,000	193,333	106,667

The allocated asset for Plan B is 193,333.

Answer is E

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Problem 20

The term "Significant Event" is defined in the instructions for the PBGC-1 form. The key point of the problem is that the threshold for "significance" is 5% or more. There are seven items listed in the instructions:

- (1) an increase in the plan's actuarial costs (consisting of the plan's normal cost under section 412(b)(2)(A) of the Code, amortization charges under section 412(b)(2)(B) of the Code, and amortization credits under section 412(b)(3)(B) of the Code) attributable to a plan amendment, unless the cost increase attributable to the amendment is less than 5% of the actuarial costs determined without regard to the amendment;
- (2) the extension of coverage under the plan to a new group of employees resulting in an increase of 5% or more in the plan's liability for accrued benefits;
- (3) a plan merger, consolidation, or spinoff that is not de minimis pursuant to the regulations under section 414(l) of the Code;
- (4) the shutdown of any facility, plant, store, etc., and that creates immediate eligibility for benefits that would not otherwise be immediately payable for participants separating from service;
- (5) the offer by the plan for a temporary period to permit participants to retire at benefit levels greater than that to which they would otherwise be entitled;
- (6) a cost-of-living increase for retirees resulting in an increase of 5% or more in the plan's liability for accrued benefits; and
- (7) any other event or trend that results in a material increase in the value of unfunded vested benefits.

All four of the items listed in the question are Significant Events.

Answer is E

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Problem 21

This problem is an extension of 2001 #10, which was the first question on the details of the suspense account for a qualified replacement plan.

§4980(a) of the Internal Revenue Code states that the excise tax upon reversion is 20%. §4980(d) states that the excise tax increases to 50% unless there is a “qualified replacement plan”, or unless certain benefit increases are granted prior to plan termination.

The general definition of a qualified replacement plan includes 95% participation by continuing employees from the terminating plan, plus an asset transfer of at least 25% of the excess assets.

Calculate the reversion as the difference between the market value of assets and the plan termination liability:

$$\begin{aligned}\text{Reversion} &= 100,000 = 1,200,000 - (1,000,000 + 100,000) \\ \text{Transfer} &= 25,000 = 25\%(100,000)\end{aligned}$$

The problem states that contributions are allocated to the participants based on compensation. You can calculate Jones' share of the 25,000 transfer:

$$\text{Jones' share} = 7,857 = 25,000 * [55,000 / (55,000 + 120,000)]$$

Under §4980(d)(2)(C)(i)(I), the plan sponsor could allocate this entire amount to Jones in the first year. The problem instead asks for the minimum first year allocation. Under §4980(d)(2)(C)(i)(II), the transferred amount can be placed in a suspense account and allocated no less rapidly than ratably over the 7 year period beginning with the year of transfer.

$$\text{Jones' alloc.} = 1,122 = 7,857 * (1/7)$$

Answer is B

2002 EA-2B Exam Solutions

Problem 22 - Page 1

Similar to 1998 #43

For a benefit payable at Social Security Retirement Age (SSRA), the maximum permitted disparity is 0.75%. You can assume the plan covers employees with all three SSRA values. In most 401(l) problems, you base your calculations on employees with SSRA=67, since that will produce the lowest benefits, and the smallest value of X.

In this problem, you are told that a single permitted disparity factor is used for all employees. The correct interpretation of this statement is that you should use the "simplified" table of permitted disparity factors, not the tables based on SSRA of 65, 66 or 67.

The plan formula is given as 1% of pay below covered compensation plus X% of pay above covered compensation. The difference between the base benefit percentage and the excess benefit percentage is X% - 1%. For a safe harbor DB plan, that difference can't exceed the permitted disparity under the 401(l) regulation.

You must derive the value of X% - 1% that will not exceed the maximum permitted disparity (MPD) factors at each age, for all forms of benefit payment. This problem does not give you any details regarding optional forms. Let ERF_y denote the early retirement reduction factor at each age y:

$$(X\% - 1\%) * (\text{service} < 40) * ERF_y \leq MPD_y * (\text{service} < 35)$$

$$X\% - 1\% \leq MPD_y * (35/40) / (ERF_y)$$

Since the benefit formula accrues service beyond 35 years, you also have to adjust the MPD on a pro-rata basis. The reason is that there is a cumulative permitted disparity limit, and the MPD is based on a maximum of 35 years of accruals. See 1.401(l)-5(c)(1), which defines the cumulative permitted disparity limit.

Age y	Simplified Table MPD_y	Early Retirement Factor _y	35 / 40 Adjust svc	Adjusted MPD_y
	(1)	(2)	(3)	(1)*(3) / (2)
67	0.784	1.0000	0.8750	0.6860
66	0.714	1.0000	0.8750	0.6248
65	0.650	1.0000	0.8750	0.5688
64	0.607	0.9600	0.8750	0.5533
63	0.563	0.9200	0.8750	0.5355
62	0.520	0.8800	0.8750	0.5170

Problem 22 - Page 2**Revised 04/11/05**

The worst case example is someone who retires at age 62, since this produces the smallest result. Since the plan formula uses the same value of X at all ages, using age 62 will give the largest allowable value for X.

The key point of this problem is that it is incorrect to say that $X\% - 1\% = .517\%$. You must also adjust the value of X to reflect that the employee is also covered under the safe harbor DC plan. If you don't do this, you will exceed the overall permitted disparity limit at 1.401(l)-5.

The overall permitted disparity rules apply to an employee who benefits under more than one plan maintained by the employer. The employee's total annual disparity fraction may not exceed 1.

The annual DC plan permitted disparity fraction equals the ratio of the disparity provided for the plan year to the maximum excess allowance. The annual DB excess plan permitted disparity fraction equals the ratio of the disparity provided for the plan year to the maximum excess allowance.

Under the DB plan, the maximum excess allowance is .517%, as calculated previously. The annual disparity fraction is $(X\% - 1\%) / .517\%$.

Under the DC plan, the maximum excess allowance is 4.0%, which is the lower of 5.7% or the base benefit percentage (see 1.401(l)-2(b)(2)). The disparity under the DC plan is the difference between the excess percentage and the base percentage, which is 1%. The annual disparity fraction is $1\% / 4\% = .25$.

Now you can derive the value of X% so the sum of the annual disparity fractions does not exceed 1.0:

$$\begin{array}{rcl} \text{DB(ADF)} + \text{DC(ADF)} & \leq & 1.0 \\ (X\% - 1\%) / .517\% + .25 & \leq & 1.0 \\ (X\% - 1\%) & \leq & .517\% * .75 \\ X\% & \leq & 1.388\% \end{array}$$

Answer is B**NOTE:**

You do not need to check the cumulative disparity limit. The reason is that the (35/40) adjustment on the prior page guarantees that the plan will not exceed that limit.

There is an alternate approach to working this problem, which produces identical results. You can check the annual disparity fraction first, based on the DB and the DC plan. The last step is to check the cumulative disparity limit.

DC PLAN

In the given plan, the disparity is 1%, which equals the excess contribution percentage (5%) minus the base contribution percentage (4%).

The annual disparity fraction for DC plans depends on the percentage of the Taxable Wage Base (TWB) used as the integration level. The maximum excess allowance is defined at 1.401(l)-2(b)(2) as the lesser of

- The base contribution percentage, or
- The greater of 5.7% (as reduced under 1.401(l)-2(d)(4)), or the old age FICA rate

The annual disparity fraction (ADF) for the DC plan equals (disparity / maximum excess allowance), which is $1\% / 4\% = .25$.

DB PLAN

In the given plan, the disparity is $X\% - 1.0\%$, which equals the excess contribution percentage minus the base contribution percentage. The annual disparity fraction for DB excess plans depends on several factors. The maximum excess allowance is defined at 1.401(l)-3(b)(2) as the lesser of

- The base benefit percentage, or
- .75% reduced as required under 1.401(l)-3(d), or 1.401(l)-3(e)

1.401(l)-3(d) contains adjustments based on the integration level. In this problem (as in all prior problems), the integration level equals 100% of covered compensation. If the integration level were greater, then the .75% would be reduced based on the table at 1.401(l)-3(d)(9). This table is not given with the EA-2B exam.

1.401(l)-3(e) contains adjustments based on benefit commencement ages other than Social Security Retirement Age (SSRA). Since the plan allows early retirement at age 62, the .75% must be reduced to reflect all benefit commencement ages down to that age.

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Problem 22 - Page 4

Added 04/24/04

In this problem, you must use the simplified table, since the problem tells you "A single factor is used for all employees". As shown in the original solution, you need to take the early retirement factors into account when determining the worst case, which is the age with the lowest adjusted MPD%:

$$(X\% - 1\%) \leq \text{MPD}_y / (\text{ERF}_y)$$

Age y	Simplified Table MPD _y	Early Retirement Factor _y	Adjusted MPD _y
	(1)	(2)	(1) / (2)
67	0.784	1.0000	0.7840
66	0.714	1.0000	0.7140
65	0.650	1.0000	0.6500
64	0.607	0.9600	0.6323
63	0.563	0.9200	0.6120
62	0.520	0.8800	0.5909

DB PLAN - ADF

The annual disparity fraction (ADF) for the DB plan equals (disparity / maximum excess allowance). The disparity provided under the plan differs at each retirement age:

$$\text{ERF}_y * (X - 1\%)$$

The maximum excess allowance also varies at each retirement age. It is the lesser of $\text{ERF}_y * 1\%$, or MPD_y under the simplified table. For this plan, it will always equal MPD_y . The ADF for the DB plan equals $[\text{ERF}_y * (X - 1\%)] / \text{MPD}_y$. We previously determined that the worst case occurs at age 62. At age 62, the ADF for the DB plan is

$$.88 * (X\% - 1.0\%) / .520\%$$

Based on the prior calculations, the ADF for the DB plan can't exceed .75, which equals 1.0 minus the DC plan ADF of .25.

$$\begin{aligned} .88 * (X\% - 1.0\%) / .520\% &\leq .75 \\ X\% &\leq 1.443\% \end{aligned}$$

DB PLAN - CDF

The prior calculation guarantees that the DB and the DC plan meet the ADF limit. But this incorrectly ignores the cumulative disparity fraction (CDF). Since the DB plan allows benefits to accrue for 40 years, you should add the disparity fractions for each year of benefit accrual, and compare them to the CDF:

$$\begin{aligned}40 * (\text{DB plan ADF}) + 35 * (\text{DC plan ADF}) &\leq 35 \\40 * [.88 * (X\% - 1.0\%) / .520\%] + 35 * (.25) &\leq 35 \\40 * [.88 * (X\% - 1.0\%) / .520\%] &\leq 35 * (1 - .25) \\X\% &\leq 1.388\%\end{aligned}$$

The final value for X% must be the lesser of the two values. The value to satisfy the CDF is (35/40) times the result to satisfy the ADF, so it is always the lower of the two values.

Answer is B

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2002 EA-2B Exam Solutions

Problem 23

This problem tests your general understanding of multiemployer plans. The basic concept is that service with both Companies A and B will count for purposes of vesting and benefit accrual under Plan X.

There is a short discussion of this at ERISA section 210(a). The rules for minimum participation and minimum vesting requirements "shall be applied as if all employees of each of the employers were employed by a single employer."

I. FALSE

Once the employee completes their 2nd year of service with Company B, they will become 100% vested. All their benefits with both Companies will be 100% vested.

II. FALSE

The basic nature of a multiemployer plan is that there is one large plan. If this item were true, then we would not have the overly complex rules for calculation of multiemployer withdrawal liability. Based on those rules, the liability is not determined solely based on liability for employees of a single company.

III. TRUE

Once the employee completes 1,000 hours during 2002, they should be eligible to participate in Plan X. It does not matter that less than 1,000 hours is completed for any single company.

Only item III is true.

Answer is D

This question covers an aspect of the definition of highly compensated employee (HCE) that has not been tested before, which is the determination of the top-paid group. You need to determine the total number of employees. Then you can determine the top 20%, for the top-paid group.

IRC section 414(q)(1) defines an HCE as any employee who

- A. Was a 5% owner at any time during the current year or the prior year, or
- B. For the preceding year
 - i. Had compensation from the employer in excess of "85,000", and
 - ii. If the employer elects application of this clause for the prior year, was in the top paid 20% of employees for the prior year

The value of 85,000 shown above is from the table furnished with the exam. Even though the HCE determination is made for 2002, the 85,000 from the table is compared against the 2001 pay.

Of the first 10 employees, three are HCEs due to stock ownership. The first eight employees may also be HCEs based on 2001 compensation, since they earned more than 85,000 in 2001. The next step is to determine 20% of the total number of employees for 2001.

IRC section 414(q)(5) defines exclusions that apply to the determination of the top paid group, and to the 414(r) rules on separate lines of business:

- A. Employees who have not completed 6 months of service
- B. Employees who normally work less than 17 ½ hours per week
- C. Employees who normally work during not more than 6 months during any year
- D. Employees who have not attained age 21
- E. Employees who are included in a unit of employees covered by a collective bargaining agreement

NOTE: the employer may elect to apply 414(q)(5)(A), (B), (C), or (D) by substituting a shorter period of service, smaller number of hours or months, or lower age than that specified in such subparagraph.

If you take these exclusions at face value, you will get the wrong answer. There are some small details in the 1.414(q)-1T regulation that are "unusual". For example, the exclusion for less than 6 months of service is based on the sum of service for two years. See 1.414(q)-1T Q&A-9 (b)(1)(i)(A), which states " ... service in the immediately preceding year is added to service in the current year in determining whether the exclusion is applicable ..."

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Problem 24 - Page 2

In this problem, we have no employees hired in 2000, so this detail has no effect. Based on the 6 months exclusion, you can ignore employees hired after 06/30/2001, since they have completed less than 6 months of service in 2001.

The key point of the problem is the exclusion for employees covered by a collective bargaining agreement (CBA). It does not apply unless 90 per cent or more of the employees are covered under a CBA, and the plan being tested only covers employees who are not covered under a CBA. See 1.414(q)-1T Q&A-9 (b)(1)(iii)(A) and (B).

As a result, you can not ignore the 5 union employees hired at 06/01/2001. For purposes of the top-paid group determination, you have the 10 employees hired before 2001, plus the 15 union and non-union employees hired at 06/01/2001, for a total of 25.

20% of the 25 employees equals 5 employees. There can be up to 5 HCEs in the top-paid group. You are given the employees ranked by pay. EE1 through EE5 are considered HCEs because they earned more than 85,000 in 2001, and they are in the top-paid group. In addition, EE9 is an HCE based on stock ownership.

The total number of HCEs is 6.

Answer is B

NOTES:

1. Rounding and tie-breaking rules may be needed for determining the members of the top-paid group. The employer may adopt any rule, as long as it is reasonable, nondiscriminatory, and uniformly and consistently applied. See the regulation at 1.414(q)-1T, A-3(b).
2. EE1 and EE3 are also considered HCEs based on stock ownership. But you still include them when you determine the top-paid group. This is based on the regulation at 1.414(q)-1T, Q&A-3 (d). If someone falls into more than one group under 414(q)(1), they should not be ignored when determining if another employee belongs to any group under 414(q)(1).
3. I simply assumed that union employees are covered by a CBA. A new exam condition was added in 2003 to make it clear that "union" means the same thing as "covered by a CBA".
4. The purpose of the top-paid group election is to minimize the number of employees considered HCEs. Without that election, there would be 9 HCEs for 2002.

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Problem 25

The PBGC-1 form has an exemption from the Variable Rate Premium for plans whose contributions in the prior year are greater than or equal to the Full Funding Limitation.

In PBGC Technical Update 00-4, it states:

“ ... Accordingly, a plan qualifies for the PBGC FFL Exemption for a plan year if the sum of contributions to the plan for the prior year (including any interest credited under the funding standard account) and any credit balance in the funding standard account (including interest to the end of the plan year) is not less than the full funding limitation under Code section 412(c)(7). “

Based on this guidance, the calculation of the Full Funding Limitation should be the same as that used for minimum funding under IRC 412. The amount of the contribution is NOT compared directly to the amount of the Full Funding Limitation, since allowance is made for the amount of the credit balance.

The FFL calculations are simplified by having end of year valuation results:

$$\begin{aligned} 412 \text{ "ERISA" FFL} &= AL + NC - (\text{Lesser}(MV, AAV) - CB) \\ &= 3,100,000 - (3,300,000 - 300,000) \\ &= 100,000 \end{aligned}$$

$$\begin{aligned} 412 \text{ "OBRA" FFL} &= 160\%(OBRA \text{ CL} + NC) - (\text{Lesser}(MV, AAV) - CB) \\ &= 160\% * 4,000,000 - (3,300,000 - 300,000) \\ &= 3,400,000 \end{aligned}$$

$$\begin{aligned} 412 \text{ "RPA" FFL} &= 90\%(RPA \text{ CL} + NC) - AAV \\ &= 90\% * 4,250,000 - 3,400,000 \\ &= 425,000 \end{aligned}$$

$$\begin{aligned} 412 \text{ final FFL} &= \text{Greater of (RPA, lesser of (ERISA and OBRA))} \\ &= 425,000 \end{aligned}$$

The amount of the contribution that would need to be made is the difference between the 412 Full Funding Limitation and the credit balance. The result is 125,000, which equals 425,000 FFL – 300,000 CB. The plan would then be exempt from the Variable Rate Premium for 2002.

Answer is B

NOTE

Due to the magnitude of the OBRA FFL, it did not matter whether you remembered that the 2001 OBRA FFL percentage was 160%.

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Problem 26

This is a multiemployer PBGC guaranteed benefits question. In general, benefit increases within the 60 months preceding the date of plan termination (DOPT) are not guaranteed. This problem does not state the DOPT, but you are only given one set of plan provisions.

In PBGC Technical Update 00-7, it states that the guarantee for multiemployer plans is \$11 per month of benefit accrual plus 75% of the next \$33 per month of benefit accrual.

The key point of this problem is how you interpret that guarantee based on the varying rates of benefit accrual over time. At ERISA Section 4022A(c)(2), it defines the accrual rate as the participant's monthly accrued benefit divided by benefit accrual service. This is the first time this concept has been tested on the enrollment exams.

Smith is age 65 at 12/31/2002. They have 10 years of benefit accrual for each segment of the benefit formula, for a total of 30 years. It is reasonable to assume that the benefit levels given in the problem are monthly rates, not annual rates.

Benefit accrual dates	Service	Monthly Accrual Rate	Monthly Benefit Accrual
Prior to 01/01/83	10 years	10	100
01/01/83 to 01/01/93	10 years	25	250
After to 01/01/93	10 years	65	650
Total	30 years		1,000

Average rate of benefit accrual:
 $33.33 = 1,000 / 30$

Guaranteed benefit accrual rate:
 $11.00 + 75\%(33.33 - 11.00) = 27.75$ per month

Guaranteed benefit:
 $832.50 = 30(27.75)$

Answer is E

NOTE

These guarantee limits apply to any multiemployer plan that has not received PBGC financial assistance within a 1-year period ending on December 21, 2000. For plans that did request PBGC financial assistance prior to December 21, 2000, the old guarantee limit apply:

\$5 per month of benefit accrual plus 75% of the next \$15 per month of benefit accrual.

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Problem 27 - Page 1

Similar to 2001 #31

Revised 04/30/03

This is the second question asked on calculations involving imputed permitted disparity. There are several items to consider:

- You can't impute permitted disparity on any 401(k) deferrals (for cross-tested plans)
- There are two different calculations that vary based on compensation level
- The annual permitted disparity factor (APDF) varies based on SSRA

There are different calculations for the imputed permitted disparity based on whether the average annual compensation exceeds covered compensation. Later we will discuss the calculation of the "A rate" and the "B rate" for NHCE3.

For employees with average annual compensation above covered compensation, you must calculate the "C rate" and the "D rate", and use the lesser of the rates. These are defined at 1.401(a)(4)-7(c)(3) as:

C Rate	D Rate
$\frac{\text{ER provided accrual}}{\text{avg. annual comp} - \frac{1}{2} (\text{covered comp.})}$	$\frac{\text{ER provided accrual} + (\text{permitted disparity factor}) * (\text{covered comp.})}{\text{Average annual compensation}}$

You are given the accrual rates for each participant. The benefit accrual (for the calculations above) equals the accrual rate multiplied by the average annual compensation.

For DB plans, the annual permitted disparity factor (APDF) is .75%, based on retirement at SSRA. This assumes use of the PDF tables that vary by SSRA. This problem tells you that the simplified table is not used.

In this problem the testing age is 65. You must reduce the APDF to allow for the difference (if any) between age 65 and each employee's SSRA.

The first step is to determine the adjusted normal accrual rate (NAR) and most valuable accrual rate (MVAR) for the HCE. You then use these adjusted rates to define the rate group for HCE1. Then you do similar calculations for each of the NHCEs to see if any of them fall within that rate group.

HCE1

This employee has an SSRA of 65, so the APDF of .75% does not have to be adjusted for the testing age of 65. They also have 45 years of testing service.

The key point to this problem is that the APDF is zero after 35 years. This prevents longer service employees from exceeding the cumulative permitted disparity limit under 1.401(l)-5(c)(1). The permitted disparity factor (PDF) is defined at 1.401(a)(4)-7(c)(4)(iii)(A), as follows:

$$\text{PDF} = (\text{sum of annual PDF}) / (\text{testing service during measurement period})$$

The resulting PDF is $.5833\% = (.75\% \times 35 + .00\% \times 10) / 45$. Now you can calculate the C rate and the D rate, as described earlier.

The NAR adjusted for imputed permitted disparity is 1.33%, the lesser of the C rate and the D rate:

$$\begin{aligned} \text{C rate (NAR)} &= 1.35\% = 1.20\%(160,000) / [160,000 - .5(36,000)] \\ \text{D rate (NAR)} &= 1.33\% = [1.20\%(160,000) + .5833\%(36,000)] / 160,000 \end{aligned}$$

The MVAR adjusted for imputed permitted disparity is 2.13%, the lesser of the C rate and the D rate:

$$\begin{aligned} \text{C rate (MVAR)} &= 2.25\% = 2.00\%(160,000) / [160,000 - .5(36,000)] \\ \text{D rate (MVAR)} &= 2.13\% = [2.00\%(160,000) + .5833\%(36,000)] / 160,000 \end{aligned}$$

Now you must do similar calculations for the other three participants. Only those with an adjusted NAR of at least 1.33%, and an adjusted MVAR of at least 2.13% will be in the rate group for HCE1.

NHCE1

This employee has an SSRA of 65, so the APDF of .75% does not have to be adjusted for the testing age of 65. They also have 40 years of testing service.

The resulting PDF is $.6563\% = (.75\% \times 35 + .00\% \times 5) / 40$. Now you can calculate the C rate and the D rate, as described earlier.

Problem 27 - Page 3**Revised 04/30/03**

The NAR adjusted for imputed permitted disparity is 1.39%, the lesser of the C rate and the D rate:

$$\begin{aligned}\text{C rate (NAR)} &= 1.45\% = .80\%(40,000) / [40,000 - .5(36,000)] \\ \text{D rate (NAR)} &= 1.39\% = [.80\%(40,000) + .6563\%(36,000)] / 40,000\end{aligned}$$

The MVAR adjusted for imputed permitted disparity is 2.09%, the lesser of the C rate and the D rate:

$$\begin{aligned}\text{C rate (MVAR)} &= 2.73\% = 1.50\%(40,000) / [40,000 - .5(36,000)] \\ \text{D rate (MVAR)} &= 2.09\% = [1.50\%(40,000) + .6563\%(36,000)] / 40,000\end{aligned}$$

Since the adjusted MVAR is less than the 2.13% value for HCE1, this participant is not in the rate group for HCE1.

NHCE2

This employee has an SSRA of 66, so the APDF of .75% must be adjusted for the testing age of 65. They also have 30 years of testing service.

The APDF for retirement at 65 with SSRA of 66 is .70% (from the table given with the exam). There is no adjustment for testing service less than 35, because the plan can't exceed the maximum permitted disparity under 401(l). The PDF equals the .70% APDF.

Now you can calculate the C rate and the D rate, as described earlier. The NAR adjusted for imputed permitted disparity is 1.45%, the lesser of the C rate and the D rate:

$$\begin{aligned}\text{C rate (NAR)} &= 1.49\% = .80\%(65,000) / [65,000 - .5(60,000)] \\ \text{D rate (NAR)} &= 1.45\% = [.80\%(65,000) + .7000\%(60,000)] / 65,000\end{aligned}$$

The MVAR adjusted for imputed permitted disparity is 2.15%, the lesser of the C rate and the D rate:

$$\begin{aligned}\text{C rate (MVAR)} &= 2.79\% = 1.50\%(65,000) / [65,000 - .5(60,000)] \\ \text{D rate (MVAR)} &= 2.15\% = [1.50\%(65,000) + .7000\%(60,000)] / 65,000\end{aligned}$$

Since both adjusted rates exceed the values for HCE1, this participant is in the rate group for HCE1.

For employees with average annual compensation \leq covered compensation, you must calculate the “A rate” and the “B rate”, and use the lesser of the rates. The unadjusted accrual rate is either the NAR or MVAR without imputing permitted disparity.

A Rate	B Rate
$2 * \text{unadjusted accrual rate}$	$\text{unadjusted accrual rate} + \text{permitted disparity rate}$

These calculations are much simpler than those for the other participants.

NHCE3

This employee has an SSRA of 67, so the APDF of .75% must be adjusted for the testing age of 65. They also have 25 years of testing service.

The APDF for retirement at 65 with SSRA of 67 is .65% (from the table given with the exam). There is no adjustment for testing service less than 35, because the plan can't exceed the maximum permitted disparity under 401(l). The PDF equals the .65% APDF.

Now you can calculate the A rate and the B rate, as described earlier. The NAR adjusted for imputed permitted disparity is 1.35%, the lesser of the A rate and the B rate:

$$\begin{aligned}\text{A rate (NAR)} &= 1.40\% = 2 * .70\% \\ \text{B rate (NAR)} &= 1.35\% = .70\% + .65\%\end{aligned}$$

The MVAR adjusted for imputed permitted disparity is 2.05%, the lesser of the A rate and the B rate:

$$\begin{aligned}\text{A rate (MVAR)} &= 2.80\% = 2 * 1.40\% \\ \text{B rate (MVAR)} &= 2.05\% = 1.40\% + .65\%\end{aligned}$$

Since the adjusted MVAR is less than the 2.13% value for HCE1, this participant is not in the rate group for HCE1.

Only NHCE2 is in the rate group.

Answer is B

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Problem 28 - Page 1

Revised 05/10/13

Smith terminated employment at 12/31/2001. The key point of the problem is that 2001 does not count as a Top Heavy year for calculating Smith's minimum Top Heavy benefit.

In general, the Top Heavy determination date is the last day of the preceding plan year. An exception to this is the first plan year, when the determination date is the last day of the first plan year.

However, based on questions T-24 and T-25 of the 1.416 regulation, the present value of accrued benefits for the DB plan (or account balance for the DC plan) is calculated as of the valuation date in the 12 month period ending on the determination date.

As shown below, 2001 is not a Top Heavy year. The determination date is 12/31/2000, and the plan's Top Heavy percentage as of the 2000 valuation date is less than 60%:

Top Heavy Year	Determination Date	Prior 12 months Valuation Date	Plan Year	Top Heavy Percentage
1990	12/31/1989	01/01/1989	1989	55%
1991	12/31/1990	01/01/1990	1990	55%
1992	12/31/1991	01/01/1991	1991	62%
1993	12/31/1992	01/01/1992	1992	62%
1994	12/31/1993	01/01/1993	1993	62%
1995	12/31/1994	01/01/1994	1994	62%
1996	12/31/1995	01/01/1995	1995	62%
1997	12/31/1996	01/01/1996	1996	55%
1998	12/31/1997	01/01/1997	1997	62%
1999	12/31/1998	01/01/1998	1998	62%
2000	12/31/1999	01/01/1999	1999	62%
2001	12/31/2000	01/01/2000	2000	55%

This problem is unusual, since it gives information about participation and benefit accrual requirements. The Top Heavy minimum must accrue for each year of service that the plan is Top Heavy (see IRC Sections 416(c)(1)(B) and 416(c)(1)(C)). IRC Section 416(c)(1)(C) references Section 411(a), which discusses vesting service - not participation service.

You don't really care about when Smith became a participant, or that the plan benefit accrues based on years of participation service. Smith apparently accrued the first year of vesting service in 1989.

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Problem 28 - Page 2

Revised 04/28/06

Smith has eight Top Heavy years shown above: 1992 - 1996 and 1998 - 2000. The Top Heavy minimum benefit is $2\% * (\text{T-H years}) * (\text{T-H pay})$.

The problem tells you nothing about the definition of T-H pay. You should use the default definition in IRC 416(c)(1)(D):

"Average High compensation for high 5 years - For purposes of this paragraph -

- (i) In General - A participant's testing period shall be the period of consecutive years (not exceeding 5) during which the participant had the greatest aggregate compensation from the employer."

Note that the definition refers to the highest five years, not just the final five years. But you don't include years after the last year when the plan was Top Heavy, per IRC 416(c)(1)(D)(iii)(II). As a result, you don't use 2001 pay in the calculation of T-H pay.

Here are all the five year averages. The highest value is 28,000, for the five years ending in 1997:

Year	Pay	5 Year Average	Years Included
1989	20,000		
1990	20,000		
1991	20,000		
1992	25,000		
1993	30,000	23,000	1989 - 1993
1994	30,000	25,000	1990 - 1994
1995	25,000	26,000	1991 - 1995
1996	25,000	27,000	1992 - 1996
1997	30,000	28,000	1993 - 1997
1998	25,000	27,000	1994 - 1998
1999	20,000	25,000	1995 - 1999
2000	30,000	26,000	1996 - 2000

Smith's Top Heavy minimum benefit at 12/31/2001 is $4,480 = 2\% * 8 * 28,000$.

Answer is A

PRACTICAL NOTE:

Some actuaries don't use the definition in the Internal Revenue Code for Top Heavy service, since it is based on years of vesting service. Why would someone accrue the Top Heavy minimum in years when there was no accrual of the plan benefits? It would be unusual (but not impossible) for someone to accrue a year of vesting service, but not get a year of benefit service.

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Problem 29 - Page 1

Similar to 2001 #35

Revised 04/24/04

This is a fairly typical problem on 415, except for the use of lump sum benefits. The first step is calculation of the plan benefit without the 415 limits.

As of 01/01/2002

Age	55	Birth date	01/01/47
Service	10 years	Hire date	01/01/92
Participation	10 years	Effective date	01/01/92
		Normal retirement age	65

This problem is unusual in that you are given the retirement benefit under the plan, prior to application of the 415 limits. Based on the plan assumptions of 6% interest and applicable mortality, you can determine the lump sum (ignoring 415 limits).

You are told that the optional form is a lump sum distribution of the normal retirement benefit. The actuarial equivalence basis has no pre-retirement mortality. You should calculate the lump sum at age 65, and discount with interest only:

$$\begin{aligned}\text{Plan lump sum at 6.0\% "app. mort."} &= 1,367,788 = 230,000(1.060)^{-10}(10.65) \\ 417(e)(3) \text{ lump sum at 5.5\% "app. mort."} &= 1,490,565 = 230,000(1.055)^{-10}(11.07) \\ \text{Greater of two lump sum values} &= 1,490,565\end{aligned}$$

Earnings under §415 are defined as total compensation. Earnings used for the §415 limits are not subject to the §401(a)(17) limit of 200,000. The §415(b)(1)(B) compensation limit is reduced when service is less than ten years.

$$100\% \text{ 3 year comp. } \$415 \text{ limit} = 200,000 = 200,000(10/10)$$

Under §415(b)(1)(A), the dollar limit is reduced when participation is less than ten years.

$$\$415 \text{ dollar limit during 2002} = 160,000 \text{ at age 62} * (10/10)$$

§415(b)(2)(E)(i) says to use the greater of 5% and the interest rate specified in the plan to reduce the §415 dollar limit prior to age 62. The examples in Revenue Ruling 98-1 clarify that the §415 dollar limit is reduced using the lower of the factors calculated based on the mandated mortality and interest rate, and plan basis for optional forms.

You are not given the “N/N” factors, since the 2002 factor table only shows \ddot{a}_x values. You should use the $(1+i)(\ddot{a}_x / \ddot{a}_y)$ factors both on the plan basis and on the mandated basis. This is consistent with the definition of the death benefit. With a death benefit equal to the present value of the accrued benefit, there is no risk of forfeiting the benefit, and there is NO mortality risk involved. The actuarial reduction prior to age 62 is calculated using the ratio of the \ddot{a}_x values, which excludes the probability of death:

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$$\begin{aligned}\text{Actuarial reduction from 62 to 55} &= (1.05)^{-7} * \ddot{a}_{62}^{(12)} / \ddot{a}_{55}^{(12)} \\ \text{(Mandated basis 5\% app. mortality)} &= (1.05)^{-7} * (12.46 / 14.35) \\ &= .6171 \\ \\ \text{(Plan basis 6\% app. mortality)} &= (1.06)^{-7} * (11.42 / 12.97) \\ &= .5856 \\ \\ \$415 \text{ dollar limit at age 55} &= 160,000 * \text{lesser of [.6171 or .5856]} \\ &= 93,693\end{aligned}$$

There is one more step, which is conversion of the 415 limit to a lump sum.

§415(b)(2)(E)(ii) says to use the greater of the applicable interest rate under 417(e)(3) and the interest rate specified in the plan to convert the 415 limit to a form of payment that is subject to 417(e)(3). The examples in Revenue Ruling 98-1 clarify that the §415 dollar limit is converted using the lower of the factors calculated based on the applicable mortality and applicable interest rate, and the plan basis for optional forms.

$$\begin{aligned}\text{Mandated basis 5.5\% app. mortality} &= 13.63 \\ \text{Plan basis 6.0\% app. mortality} &= 12.97 \\ \\ \$415 \text{ Lump sum at age 55} &= 93,693 * \text{lesser of [13.63 or 12.97]} \\ &= 1,215,192\end{aligned}$$

Since the lump sum under 415 is lower than the plan lump sum of 1,490,565, the participant's lump sum benefit must be limited to 1,215,192.

Answer is B

NOTE:

The problem's data is confusing. You are given a date of benefit commencement at 1/1/2002, and a benefit of 230,000. It is not clear whether the benefit is the early retirement benefit, or the normal retirement benefit. Based on the optional form definition, it should be the normal retirement benefit.

In my original solution, I did not read the problem carefully enough. I thought the participant could get a lump sum based on the early retirement benefit. This produced a much larger lump sum, which luckily gave the same final answer:

$$\begin{aligned}\text{Plan lump sum at 6.0\% "app. mort."} &= 2,983,100 &= 230,000(12.97) \\ \text{417(e)(3) lump sum at 5.5\% "app. mort."} &= 3,134,900 &= 230,000(13.63) \\ \text{Greater of two lump sum values} &= 3,134,900\end{aligned}$$

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Problem 30 - Page 1

The general rule in the regulation is that all plan participants must be at least as well funded after a spinoff or a merger, as they were prior to the event. This requirement can be easily satisfied for a spinoff, but not for a merger, and that is where the special schedule is needed. For small plans, you can use the de minimis rule to avoid the special schedule entirely.

In general, two plans will be funded at different levels under ERISA section 4044 prior to the merger. Some participants in the better funded plan would receive a lower benefit if the plan terminated immediately after the merger. You must calculate the benefit they would receive if the plan terminated immediately prior to the merger. The difference in the amount of the benefit is what goes into the special schedule.

Before the merger - benefits provided if plans terminated

First, determine the percentage funding of each plan, based on terminating before the merger. One thing that can make the calculations simpler is to work with liabilities instead of benefits. At the very end of the problem, you can convert the liability into annual benefits.

Plan A	Total Liability	Allocated Assets	Allocation Per Cent
PC3	150,000	150,000	100.00%
PC4	94,000	94,000	100.00%
PC5	37,000	6,000	16.22%
Total	281,000	250,000	

After covering PC3 and PC4 in Plan A, there are 6,000 of assets remaining (250,000 - 150,000 - 94,000). The 6,000 in assets will be spread over the 37,000 liability:
 $16.22\% = 6,000 / 37,000$.

Plan B	Total Liability	Allocated Assets	Allocation Per Cent
PC3	170,000	170,000	100.00%
PC4	50,000	30,000	60.00%
PC5	-	-	0.00%
Total	220,000	200,000	

After covering PC3 in Plan B, there are 30,000 of assets remaining (200,000 - 170,000). The 30,000 in assets will be spread over the 50,000 liability:
 $60.00\% = 30,000 / 50,000$.

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Problem 30 - Page 2

After the merger - benefits provided if plans terminated

Based on 1.414(l)-1(f)(2), you start with the asset allocation percentage and priority category based on the lower funded plan, which is Plan B. You can determine the special schedule benefit by looking at the difference between the two plans' pre-merger asset allocation formulas:

Plan A: $100\% \text{ PC3} + 100\% \text{ PC4} + 16.22\% \text{ PC5}$

Plan B: $100\% \text{ PC3} + 60\% \text{ PC4}$

The special schedule benefit for participants in Plan A is $40.00\% \text{ PC4} + 16.22\% \text{ PC5}$. That represents the additional benefits that would be provided if the plans terminated immediately after the merger. You can apply this formula directly to the benefit amounts given for Plan A participants:

$$\begin{array}{llll} \text{PC4} & \text{EE1} + \text{EE2} & 40.00\%(5,000 + 4,000) = & 3,600 \\ \text{PC5} & \text{EE2} + \text{EE3} & 16.22\%(2,000 + 1,000) = & \underline{486} \\ & & & 4,086 \end{array}$$

Answer is C

You could go through a lot more effort to identify values on a per person basis, both for allocated assets, and corresponding benefit amounts. The solution shown above is the shortest one possible.

Problem 31 - Page 1

Similar to 2000 #27

This is a relatively straightforward PBGC guaranteed benefits question. It tests your knowledge of the five year phase-in for non-owners, as well as the handling of phase-ins for retired employees. Guaranteed benefits are based on the vested accrued benefits of the plan participants. In calculating the guaranteed benefit, remember that changes in vesting schedule, normal retirement age, early retirement reductions, and normal form of annuity payment are all considered as changes in benefit amount subject to the phase in rules.

If there were a change in normal form of benefits, you would have to normalize the benefits. Normalization is the process of converting benefits available under earlier sets of plan provisions to equivalent benefit amounts based on the plan provisions in effect at date of plan termination (DOPT). This is a necessary step, otherwise you would be comparing apples and oranges.

The changes in plan benefits at 01/01/98 and 01/01/00 are subject to phase-ins at the DOPT of 07/01/2001. Based on item nine on page 84 of the PBGC study note, use the later of the adoption date and the effective date of the increase for phase-in purposes.

The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. You are given Smith's compensation as 4,000. This is much larger than the MGB limit of 3,392.05 at age 65. The MGB is defined assuming payment on a life annuity basis at age 65.

A key point to this problem is that you should use the later of age at DOPT and age at benefit commencement for purposes of adjusting the MGB. The MGB should be adjusted based on the age at DOPT (beyond retirement) of 61. In addition, the MGB must be adjusted to allow for the payment form of 50% J&S.

The age 61 adjusted MGB is $2,442.28 = [1 - 4(.07)] * 3,392.05$. After allowing for the 50% J&S payment form, the adjusted MGB is $2,198.05 = .90 * 2,442.28$. Based on page 72 of the PBGC study note, it is correct to age adjust the MGB, even when it is based on the highest five year compensation.

One simplifying aspect of this problem is that you are given the monthly benefit amounts. You typically have to determine the accrued benefit and early retirement reduction factors for PBGC guaranteed benefit problems involving retired participants.

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Problem 31 - Page 2

	Smith: 5 year phase-ins
Date of birth	07/01/40
07/01/01 age	61
Date of retirement	07/01/00
Vesting percentage	100% based on prior retirement
01/01/96 early retirement benefit	1,500.00
Full years plan has been in effect	5
Phase-in	1,500.00
01/01/98 early retirement benefit	2,100.00
Guaranteeable benefit increase	$600.00 = 2,100.00 - 1,500.00$
Full years plan has been in effect	3
3 year phase-in	$360.00 = \text{Greater of } 60\%(600.00) \text{ or } \$60/\text{mo},$ but not greater than the GBI
01/01/00 early retirement benefit	2,500.00
Maximum Guaranteeable benefit	2,198.05
Guaranteeable benefit increase	$98.05 = 2,198.05 - 2,100.00$
Full years plan has been in effect	1
2 year phase-in	$20.00 = \text{Greater of } 20\%(98.05) \text{ or } \$20/\text{mo}$
Total guaranteed monthly benefit	$1,880.00 = 1,500.00 + 360.00 + 20.00$

Answer is C

Notes re: Guaranteed benefit calculations

1. The MGB does not increase beyond the year of plan termination. See Example 13 in Appendix A of the PBGC study note.
2. You should use the later of age at DOPT and age at benefit commencement for purposes of adjusting the MGB for age. See Example 16 in Appendix A of the PBGC study note.
3. You should use the form of payment in effect at the later of age at DOPT and age at benefit commencement for purposes of adjusting the MGB for form of payment. See Example 18 in Appendix A of the PBGC study note.
4. For retirements after DOPT, all benefit service accruals ceased at DOPT.
5. When calculating the phase-ins, the percent is more valuable when the amount of the Guaranteeable benefit increase exceeds 100. If it is less than 100, then the fixed dollar amount is more valuable. At 100, they both produce the same result.

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Problem 32

This is a safe harbor design that has not been tested on earlier enrollment exams. The definition of the safe harbor is not contained in 1.401(a)(4)-3(b) with the other safe harbors. It is in 1.401(a)(4)-8(d), which mostly covers cross-testing of DB or DC plans.

The benefit payable under the DB plan should be reduced by the actuarial equivalent of the employee's account balance under the profit sharing plan. The key point of the problem is that, in a safe harbor floor-offset plan, you can't offset the actuarial equivalent of the 401(k) balance.

In a safe harbor floor-offset plan, you can use an interest rate no greater than the highest standard interest rate to offset the actuarial equivalent of the DC account balance. "Standard interest rate" is defined in the regulation as between 7.5% and 8.5%.

At 01/01/2002, Smith is age 52, and has 5 years of service. The gross benefit under the DB plan is $7,500 = 3\%(50,000)(5)$. This is the accrued benefit, payable at normal retirement age 65.

At 01/01/2002, Smith's vested profit sharing balance is 10,000. Another requirement of a safe harbor floor-offset plan is that you can only offset non-forfeitable benefits by the actuarial equivalent of DC benefits that are non-forfeitable.

The calculation of the PV at age 65 uses the 8.5% pre-retirement rate to accumulate the total contribution up to age 65. The actuarial equivalent benefit at age 65 is that result divided by the 7.5% annuity value at 65:

$$\begin{aligned}\text{DC amount at 65} &= 10,000 * (1.085)^{65-52} \\ &= 28,879\end{aligned}$$

$$\text{Equivalent benefit} = 28,879 / (\ddot{a}_{65}^{(12)} \text{ at } 7.5\%)$$

This problem was eliminated as defective, since there are no factors given at the 7.5% post-retirement interest rate. The corresponding annuity factor has a value of 9.52, and the equivalent benefit at 65 is 3,033.54.

$$\begin{aligned}\text{Net benefit at 65} &= 7,500.00 - 3,033.54 \\ &= 4,466.46\end{aligned}$$

$$\begin{aligned}417(e)(3) \text{ lump sum} &= (1.055)^{52-65} * 4,466.46 * (\ddot{a}_{65}^{(12)} \text{ at } 5.5\%) \\ &= .4986 * 4,466.46 * 11.07 \\ &= 24,651\end{aligned}$$

Answer is B

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Problem 33 - Page 1

Similar to 2001 #33

This problem tests your knowledge of the method for adjusting assets and discounting contributions under the Alternative calculation method (ACM) for calculating the Variable Rate Premium (VRP) on the PBGC-1 Form, Schedule A.

Since this is the 2002 PBGC premium calculation under the ACM, the determination date is 01/01/2001. You must calculate the adjusted liability values.

This problem was eliminated as defective, since there were printing errors in the formulas that were furnished with the tables for the 2002 exam. Here is the formula:

$$VB_{adj} = VB_{pay} * 0.94^{(RIR-BIR)} + [VB_{Nonpay} * 0.94^{(RIR-BIR)} * ((100+BIR)/(100+RIR))^{(ARA-50)}]$$

In the formula, RIR equals 4.75 and BIR equals 6.00 (100 times the required interest rate and the current liability interest rate, respectively). One potential key point of the problem is that, for participants who are not in pay status, the formula does not include the 1.07 adjustment in the PBGC-1 instructions.

	In pay status	Not in pay status
Group	Retired	Active and terminated vested
Unadjusted vested liability	1,000,000	3,260,000
Adjustment factor	$.94^{(4.75-6.00)}$ = 1.0804	$1.07 * (.94^{(4.75-6.00)}) * [(106.00/104.75)^{15}]$ = 1.3812
Adjusted vested liability	1,080,414	4,502,659

The total adjusted vested current liability at 01/01/2001 is 5,583,073.

Use the asset value at 01/01/01, and reduce it by any included receivable contributions. Then you must add the discounted value of “contributions paid for plan years prior to the premium payment year ...” The interest rate used for discounting assets is always the Required Interest Rate:

$$\begin{aligned} \text{01/01/01 Adjusted assets} &= (5,000,000 - 200,000) + 200,000 * (1.0475)^{(-8.5/12)} \\ &\quad + 150,000 * (1.0475)^{(-17/12)} \\ &= 5,133,988 \end{aligned}$$

$$\begin{aligned} \text{01/01 Unfunded vested liability} &= 5,583,073 - 5,133,988 \\ &= 449,085 \end{aligned}$$

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Problem 33 - Page 2

Revised 05/03/05

The adjusted value of the unfunded benefits liability is the excess of the liabilities over the adjusted assets, "adjusted for the passage of time from the first day of the plan year preceding the premium payment year to the premium snapshot date." The interest rate used for the adjustment is the Required Interest Rate:

$$\begin{aligned} 01/02 \text{ Unfunded vested liability} &= 449,085 * 1.0475 \\ &= 470,416 \end{aligned}$$

The adjusted unfunded benefits liability must be rounded up to the next multiple of 1,000. The last step is to multiply the adjusted value of the unfunded benefits liability by .009:

$$\begin{aligned} 2002 \text{ Variable rate premium} &= 471,000 * .009 \\ &= 4,239 \end{aligned}$$

Answer is D

NOTES:

- Here is the definition of the assets to use for the VRP calculation from the PBGC-1 instructions:
"General Rule filers: Enter the actuarial value of the plan's assets determined in accordance with ERISA section 302(c)(2) without a reduction for any credit balance in the funding standard account.

ACM filers: Enter the value of assets as reported on the XXXX Schedule B, item 1b(2), if the date reported on the XXXX Schedule B, item 1a, is the first day of the XXXX plan year. But, if that date is not the first day of the XXXX plan year, enter the value of assets as of the first day of the XXXX plan year, as reported in item 2a of the same Schedule B."

Item 1b(2) refers to the actuarial value of assets, and item 2a refers to the market value of assets.
- In this problem, the valuation date is 12/31/01, and the AAV at that date is 5,030,000. The VRP calculation used the market value of 5,000,000 on the first day of the plan year (at 01/01/01).
- The Alternative Calculation Method (ACM) normally uses current liability values from the prior year's Schedule B. The adjusted liability values allow for the difference between the current liability interest rate and the required interest rate.
- You may value current liabilities at the required interest rate under the ACM, but only if the required interest rate exceeds the current liability interest rate. Then the only adjustment made to the current liabilities is the 1.07 factor for those not yet in pay status.

Problem 34 - Page 1

Revised 04/24/04

This is the first benefit accrual rule question on the exam that required some serious thought. The challenge in this problem is to identify the maximum value of X in the fewest possible calculations.

Under the 3% rule of 411(b)(11)(A), each year's accrued benefit must be at least equal to 3% times years of service times the projected benefit. The first step is calculation of the projected benefit:

$$\text{Projected benefit} = 270 + 5X = 50 + 8*10 + 10*14 + X*5$$

Let t represent years of service. Under the 3% rule, you must satisfy this relationship for every possible value of t:

$$\text{Accrued benefit at time } t \geq 3\%(t)(270+5X)$$

If you look at the answer ranges, you can see that X exceeds the rate of benefit accrual for years 2 through 25. If you think about testing years 2 through 11, the worst case would be the 11th year. The reason is that you will have 10 years of accrual at \$8 (which is less than X), which will produce the largest difference between the plan accrued benefit, and the 3% rule formula.

Continuing in the same manner, think about testing years 12 through 25. The worst case would be the 25th year. The reason is that you will have 14 years of accrual at \$10 (which is less than X), which will produce the largest difference between the plan accrued benefit, and the 3% rule formula.

You can solve for the required value of X by looking at the accrued benefit after 25 years of service:

$$\begin{array}{ll} \text{Accrued benefit at time 25} & \geq 3\%(25)(270+5X) \\ 50 + 8*10 + 10*14 = 270 & \geq 75\%(270+5X) \end{array}$$

$$18.00 \geq X$$

Answer is E

On the next page, I show the wrong way to work the problem. Instead of thinking about how the 3% rule works, you can use brute force to prove that X can't exceed 18. But it takes far too long to do all the calculations.

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Problem 34 - Page 2 (THE WRONG WAY!)

Let t represent years of service. Under the 3% rule, you can set up this relationship:
Accrued benefit at time $t \geq 3\%(t)(270+5X) = t(8.10 + .15X)$

Years 2 through 11

For years 2 through 11, the accrued benefit can be expressed as $50 + 8(t-1)$:

$$50 + 8(t-1) \geq t(8.10 + .15X)$$

$$50 + 8t - 8 \geq 8.1t + (.15t)X$$

$$(42 - .1t)/.15t \geq X$$

$$280/t - .6667 \geq X$$

For years 2 through 11, the value of X changes linearly with t . In year 2, X can't exceed 139.33. In year 11, X can't exceed 24.79.

Years 12 through 25

For years 12 through 25, the accrued benefit can be expressed as $130 + 10(t-11)$:

$$130 + 10(t-11) \geq t(8.10 + .15X)$$

$$130 + 10t - 110 \geq 8.1t + (.15t)X$$

$$(20 + 1.9t)/.15t \geq X$$

$$133.33/t + 12.67 \geq X$$

For years 12 through 25, the value of X changes linearly with t . In year 12, X can't exceed 23.78. In year 25, X can't exceed 18.00.

Years 26 through 30

For years 26 through 30, the accrued benefit can be expressed as $270 + X(t-25)$:

$$270 + X(t-25) \geq t(8.10 + .15X)$$

$$270 + Xt - 25X \geq 8.1t + (.15t)X$$

$$(270 - 8.1t) \geq 25X - .85tX$$

$$(270 - 8.1t)/(25 - .85t) \geq X$$

For years 26 through 30, the value of X changes in a non-linear fashion. If you look at just the endpoints, the numbers are strange:

	Maximum
<u>Year</u>	<u>value of X</u>
26	20.48
27	25.02
30	-54.00

As service approaches 30, the maximum allowable value of X increases. At 30 years of service, X can be any positive number.

Answer is E

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Problem 35

This question tests your knowledge of the regulation governing "Standards of performance of actuarial services". Each of these is almost a direct quote from the regulation at 20 CFR Part 901.20.

I. TRUE

The notification is discussed in 901.20(h), which is a bit more general. That section discusses the need for notification once an enrolled actuary discovers the non-filing of any actuarial document they have signed. The notification should be made to the IRS, DOL, or PBGC, depending on where the document should have been filed.

II. FALSE

This item has been tested numerous times on past exams. In 901.20(d), it states that a conflict of interest does not prevent an actuary from performing services. Once they have made full disclosure of the conflict of interest, they can continue to provide actuarial services. The disclosure should be made to the plan trustees, any named fiduciary of the plan, and the plan administrator (and the collective bargaining representative, if applicable).

III. TRUE

This mirrors the requirements for an actuarial report or certificate in 901.20(f).

Only items I and III are true.

Answer is B

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Problem 36 - Page 1

Similar to 2001 #32

This problem gives you information about two plans. Plan A is a defined benefit plan with an eligibility requirement of 1 year, sponsored by Company A. Plan B is a defined contribution plan with an eligibility requirement of six months, sponsored by Company B.

This is the first 410(b) question on the exam that has two plans with differing eligibility requirements. The key point of the problem is the determination of the Ratio Percentage test and the Average Benefits test in this situation.

The question asks how Plan A can pass the coverage requirements of 410(b). In general, a plan must meet one of three requirements:

- (A) Plan benefits at least 70% of ees who are not Highly compensated ees (HCEs), or
- (B) Plan benefits a percentage of ees who are not HCEs which is at least 70% of the percentage of HCEs that benefit under the plan, or
- (C) Plan meets the requirements of the average benefits test

Plan A can either pass the Ratio Percentage test, or the Average Benefits test on a stand-alone basis. Or it could pass one of these two tests when combined with Plan B.

Ratio Percentage test

The ratio percentage is defined under the regulations at §1.410(b)-9 as the percentage of non-highly compensated employees (NHCEs) who benefit under the plan divided by the percentage of highly compensated employees (HCEs) who benefit under the plan:

$$\text{Ratio \% test: } \frac{\left(\frac{\text{Non HCEs who benefit}}{\text{Total Non-excludable non HCEs}} \right)}{\left(\frac{\text{HCEs who benefit}}{\text{Total Non-excludable HCEs}} \right)}$$

The percentage of NHCEs who benefit under the plan equals the number of NHCEs in the plan divided by the total number of non-excludable NHCEs. The percentage of HCEs who benefit under the plan equals the number of HCEs in the plan divided by the total number of non-excludable HCEs.

Depending on whether the employer elects to aggregate plans, you may use only the employees benefiting under a single plan for the numerator in the ratio percentage test. There are some complicated rules in the 1.410(b)-7 regulation that govern when you can voluntarily aggregate plans, as well as when you must mandatorily disaggregate plans.

The ratio denominators should be based on counts for the entire controlled group, not just for the single plan being tested. The excludable employees include those who do not meet the minimum participation requirements, collectively bargained employees, and nonresident aliens.

If you aggregate plans for the Ratio Percentage test, the excludable employees will be those who meet none of the eligibility requirements for the plans that are aggregated. You will do that for some parts of this problem.

In this problem, you are told that the otherwise excludable employees are not tested separately. Otherwise, you would treat as a separate plan all employees who do not satisfy the 410(a)(1) minimum participation requirements (age 21 and 1 year of service). Then you would have to meet the requirements in 1.410(b)-6(b)(3).

Nondiscriminatory classification requirement

The average benefit test in 1.410(b)-2(b)(3) requires that a plan satisfy both the nondiscriminatory classification test, and the average benefit percentage test (ABPT). 1.410(b)-4(c) states that a plan satisfies the nondiscriminatory classification test when the plan's ratio percentage is greater than or equal to the Safe harbor percentage, and the plan has a reasonable classification of employees.

1.410(b)-4(c)(4) defines the Safe and Unsafe harbor percentages based on the non-highly compensated concentration percentage (NHCCP). The NHCCP is defined under the regulations at §1.410(b)-4(c)(4)(iii) as the ratio of non-excludable NHCEs to total non-excludable employees.

The regulation defines the NHCCP as "for all employees of the employer." For the NHCCP, the regulation states that the excludable employees are the same as under the ABPT, which uses "all plans in the testing group."

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Problem 36 - Page 3

Average Benefits Percentage test

The average benefit percentage test is defined under the regulations at §1.410(b)-5 as the ratio of the actual benefit percentage (ABP) for non-highly compensated employees (NHCEs) who benefit under the plan divided by the ABP for highly compensated employees (HCEs) who benefit under the plan.

1.410(b)-7(e) states that "all plans in the testing group" must be taken into account for the average benefit percentage test. It goes on to define "all plans in the testing group" as the plan being tested, plus all plans that could be permissively aggregated under 1.410(b)-7(d). This permissive aggregation for ABPT ignores

- 1.410(b)-7(d)(4) QSLOB rule
- 1.410(b)-7(d)(5) requirement re: same plan years
- Mandatory disaggregation rules for 401(k) / 401(m), and ESOP / non ESOP

The ABP for NHCEs equals the sum of benefit accrual rates for NHCEs in the plan divided by the total number of non-excludable NHCEs. The ABP for HCEs equals the sum of benefit accrual rates for HCEs in the plan divided by the total number of non-excludable HCEs.

A. Plan A passes the Ratio Percentage test

FALSE

When Plan A is tested alone, use its one year eligibility requirement to construct the values for the Ratio Percentage test. The only HCEs are in Plan A, so most of the work is for the NHCEs in all three companies:

	NHCEs Benefiting	NHCEs Non-excludable	HCEs Benefiting	HCEs Non-excludable
Company A	200	100 + 100 = 200	200	200
Company B		200 + 400 = 600		
Company C		100		
Total	200	900	200	200

Plan A ratio % = [200 / 900] / [200 / 200]
 = 22.2% / 100%
 = 22.2% (FAILS)

B. Plan A passes the Average Benefits test

FALSE

When Plan A is tested alone, the denominator for of the ratio percentage is based on its one year eligibility requirement. For the non-highly compensated concentration percentage, you use the same excludables as the Average Benefits Percentage test.

Under the Average Benefits Percentage test, you must aggregate all plans. The excludable employees are those who meet none of the eligibility requirements for the two plans. Employees who meet either plan eligibility requirement will be non-excludable:

	NHCEs Non-excludable	HCEs Non-excludable
Company A	100 + 100 + 100 = 300	200
Company B	200 + 400 + 100 = 700	
Company C	100 + 100 = 200	
Total	1,200	200

$$\begin{aligned} \text{NHCCP} &= [1,200 / (1,200+200)] \\ &= 85.71\% \end{aligned}$$

The NHCCP should be truncated to 85%. Then you can look up the Safe and Unsafe harbor percentages in the table given with the exam. The Safe harbor percentage is 31.25%, and the Unsafe harbor percentage is 21.25%.

The Ratio Percentage test result of 22.2% is lower than the Safe harbor percentage, but greater than the Unsafe harbor percentage. The only way that Plan A can pass 410(b) is based on a facts and circumstances test. In the absence of any additional information, it is safe to assume that Plan A fails 410(b). You do not need to do the calculations for the Average Benefits Percentage test.

C. Plans A+B pass the Ratio Percentage test

FALSE

When Plan A is aggregated with Plan B, the excludable employees are those who meet none of the eligibility requirements for the two plans. Employees who meet either plan eligibility requirement will be non-excludable. One key point of the problem is that the determination of the non-excludable employees (and the resulting ratio percentage) is now different than under Item A (where Plan A was tested alone). The only HCEs are in Plan A, so most of the work is for the NHCEs in all three companies.

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C. Plans A+B pass the Ratio Percentage test - continued

	NHCEs Benefiting	NHCEs Non-excludable	HCEs Benefiting	HCEs Non-excludable
Company A	200	100 + 100 + 100 = 300	200	200
Company B	500	200 + 400 + 100 = 700		
Company C		100 + 100 = 200		
Total	700	1,200	200	200

$$\begin{aligned}
 \text{Plan "A+B" ratio \%} &= [700 / 1,200] / [200 / 200] \\
 &= 58.3\% / 100\% \\
 &= 58.3\% \quad (\text{FAILS})
 \end{aligned}$$

D. Plans A+B pass the Average Benefits test

FALSE

When Plan A is aggregated with Plan B, the excludable employees are those who meet none of the eligibility requirements for the two plans. Employees who meet either of the two plans' eligibility requirements will be non-excludable.

The NHCCP has exactly the same value as previously calculated:

$$\begin{aligned}
 \text{NHCCP} &= [1,200 / (1,200+200)] \\
 &= 85.71\%
 \end{aligned}$$

The NHCCP should be truncated to 85%. Then you can look up the Safe and Unsafe harbor percentages in the table given with the exam. The Safe harbor percentage is 31.25%, and the Unsafe harbor percentage is 21.25%.

Since the Ratio Percentage test result from Item C is greater than the Safe harbor percentage, it is possible that Plan A can pass 410(b). Now you must do the calculations for the Average Benefits Percentage test. The denominators for calculating the average benefit percentage are the same numbers used for the calculation of the NHCCP:

	NHCEs Benefit percentages	HCEs Benefit percentages
Company A	100*0% + 100*4% + 100*4% = 0% + 400% + 400% = 800%	200 * 3% = 600%
Company B	200*0% + 400*3% + 100*4% = 0% + 1200% + 400% = 1600%	
Company C	100*0% + 100*0% = 0% + 0% = 0%	
Total	2,400%	600%

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D. Plans A+B pass the Average Benefits test - continued

$$\begin{aligned}\text{Plan "A+B" ABPT} &= [(2,400\% / 1,200) / (600\% / 200)] \\ &= 2.0\% / 3.0\% \\ &= 66.67\% \quad (\text{FAILS})\end{aligned}$$

Since the ABPT result is less than 70%, Plan A does not pass the Average Benefits test when it is aggregated with Plan B.

None of items A, B, C or D is true.

Answer is E

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Problem 37

This question tests your knowledge of the minimum vesting requirements in IRC Section 411(a).

I. FALSE

This does not satisfy the minimum vesting requirements. It fails at 4 years for the graded vesting, since it is less than 40% at that point. It fails at 5 years for the cliff vesting, since it is less than 100% at that point.

II. FALSE

This does not satisfy the cliff vesting due to the requirement for "full calendar years of service". The definition of year of service in IRC Section 411(a)(5)(A) only requires completion of 1,000 hours in a 12 month period. A participant should be 100% vested before the end of the 5th calendar year.

III. TRUE

This does satisfy the cliff vesting requirement. The key is the definition of a year of service, which satisfies the definition in IRC Section 411(a)(5)(A). This definition allows use of the plan year, or calendar year, or any 12 month period that is not specifically prohibited by the regulations.

Only item III is true.

Answer is E

NOTE

The definition of year of service for the minimum participation requirements is slightly different than for minimum vesting requirements. The definition in IRC Section 410(a)(3)(A) requires use of 12 month periods starting at hire date. For a participant who does not complete 1,000 hours in the first 12 month period, you can then use the plan year as the 12 month computation period.

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Problem 38 - Page 1

There are two parts to this problem. One is determination of the employer withdrawal liability. The other is determination of the type of partial withdrawal, and the fraction used to calculate the partial withdrawal liability. You must do the partial withdrawal calculations first, since you don't know the actual date of the withdrawal.

Partial Withdrawal Calculations

This problem does not clarify the type or the date of the partial withdrawal. It is either a regular partial withdrawal, or one due to a 70% decline in contributions. Due to the lack of information, you have no choice but to assume that the partial withdrawal occurred due to a 70% decline in contributions.

A 70% contribution decline occurs when 30% of “units in the high base year” exceeds the units in each year of the “three year testing period”. The “three year testing period” includes the year that the 70% decline occurs as the last year. The “units in the high base year” is the average of the two highest years in five years preceding the “three year testing period”.

You must calculate the various items to see when a 70% decline has occurred. If you have worked these problems before, you know that the units during the three year testing period have to be much lower than the prior five years. You should guess 1998 - 2000 as a starting point:

Assumed year	2000	2001
3 year testing period	1998-2000	1999-2001
Highest units in 3 year testing period	90,000	70,000
Highest testing / .30	300,000	233,333
Base years	1993-1997	1994-1998
Any base years exceed the Highest testing/.30?	NO	YES

Verification of 70% decline in 2001	2001
High base years	1994, 1995
Units in high base year	$.5 \times (270,000 + 230,000)$ = 250,000
30% of units in high base year	75,000
70% decline occurred?	YES

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Revised 04/21/03

To calculate the partial withdrawal liability due to a 70% contribution decline,

- (1) The initial year of the three year testing period is considered as the year of withdrawal for calculation of employer share of UVB
- (2) The fraction to multiply the “complete withdrawal” liability by is

$$1.0 - \frac{\text{Base units for plan year following last year of three year testing period}}{\text{Average base units during 5 yr. period preceding three year testing period}}$$

$$\begin{aligned}\text{Fraction} &= 1.0 - \frac{2002 \text{ units}}{(\text{Sum of 1994 through 1998 units}) / 5} \\ &= 1.0 - \frac{78,000}{(270,000 + 230,000 + 110,000 + 110,000 + 90,000) / 5} \\ &= 1.0 - 78 / 162 \\ &= 51.85\%\end{aligned}$$

Withdrawal Liability Calculations

As described above, due to the 70% partial withdrawal, you should assume 1999 is the year of withdrawal for calculating the employer share of the UVB. Under the Rolling Five Method, the calculation of withdrawal liability is relatively simple. Employer A's share of the 12/31/98 UVB is based on the ratio of employer A's contributions in the prior five years to the total contributions in the prior five years:

YEAR:	1994	1995	1996	1997	1998
ER share=	$2,500,000 * \frac{(135,000 + 115,000 + 55,000 + 55,000 + 45,000)}{(800,000 + 800,000 + 750,000 + 750,000 + 725,000)}$				
ER share=	$2,500,000 * \frac{405}{3,825}$				
=	264,706				

After determining Employer A's share of the UVB, the de minimis amount must be calculated. Then a deductible is calculated based on the amount of the de minimis and the employer's share of the UVB. The final withdrawal liability is calculated as the employer's share less the deductible.

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The problem tells you nothing about the plan's definition of the de minimis amount, so you should use the mandatory de minimis. The mandatory de minimis is the lesser of 50,000 or 3/4% of the plan's total UVB ($.0075 * 2,500,000 = 18,750$), which is 18,750.

The deductible is the de minimis amount reduced by the excess of the allocated UVB over 100,000. Since the employer's share is 264,706, the excess is 164,706. As a result, the deductible equals zero.

The final employer withdrawal liability is the employer share, multiplied by the partial withdrawal liability fraction:

$$\begin{aligned}\text{Partial Withdrawal liability} &= 51.85\%(264,706) \\ &= 137,255\end{aligned}$$

Answer is C

NOTES

You don't need to calculate the de minimis or the deductible. Any time the employer share exceeds 150,000, the deductible will equal zero. The excess of the UVB over 100,000 will be 50,000 or more. Since the de minimis is 50,000 or less, the resulting deductible must be zero.

For the alternative de minimis, the deductible and de minimis values are increased by 50,000. Any time the employer share exceeds 250,000, the deductible will equal zero.

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