



# **Solutions to the 2008 EA-2A Exam**

**by David B. Farber,  
A.S.A., E.A., M.S.P.A.**

***Note:  
NO RETURN IF OPENED***



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## ABOUT THIS MANUAL

The solutions in this manual represent the author's interpretation of the correct method of solving each of the questions from the 2008 EA-2A examination. The solutions follow the rules of ERISA and the Internal Revenue Code as of June, 30, 2008. Note that this may not represent changes reflected under current law, including PPA technical corrections.

The actual examination questions are available on ASM's web site at [www.studymanuals.com](http://www.studymanuals.com).

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## Solutions to EA-2(A) Examination Fall, 2008

### Question 1

IRC section 430(g)(4) requires that for years beginning after 2008, receivable contributions must be included in the market value of assets, interest adjusted from the date paid back to the valuation date using the effective interest rate for the preceding plan year. Therefore, the \$40,000 receivable contribution for 2008 must be interest adjusted for 8½ months using the 2008 plan effective rate of 6.5%, and then added to the fair market value of the assets as of 1/1/2009.

$$\begin{aligned}\text{Market value of assets as of 1/1/2009} &= \$200,000 + (\$40,000/1.065^{8.5/12}) \\ &= \$200,000 + \$38,255 \\ &= \$238,255\end{aligned}$$

Answer is B.

### Question 2

The minimum required contribution must be developed for 2008. The target normal cost is equal to the present value of the difference between the 12/31/2008 accrued benefit (taking into account the 6% expected salary increase for 2008) and the 1/1/2008 accrued benefit (ignoring the expected salary increase for 2008).

$$\begin{aligned}1/1/2008 \text{ accrued benefit} &= 3\% \times \$120,000 \times 12 \text{ years of service} = \$43,200 \\ 12/31/2008 \text{ accrued benefit} &= 3\% \times \$120,000 \times 1.06 \times 13 \text{ years of service} = \$49,608\end{aligned}$$

In determining the present value, the segment interest rates must be used. Smith is 40 as of 1/1/2008. The third segment interest rate is applicable for all payments made beginning with the 21<sup>st</sup> year after the valuation date. Since Smith's first benefit payment will be at age 65 (the assumed retirement age according to the exam general conditions), only the third segment interest rate is applicable for all benefit payments.

$$\begin{aligned}\text{Target normal cost}_{1/1/2008} &= (49,608 - 43,200) \times \ddot{a}_{65(7\%)}^{(12)} \times v_{.07}^{25} \\ &= 6,408 \times 8 \times 0.184249 = 9,445\end{aligned}$$

The funding target is equal to the present value of the 1/1/2008 accrued benefit (ignoring the expected salary increase for 2008). In determining the present value, the segmented interest rates must be used in the same manner as for the target normal cost.

$$\begin{aligned}\text{Funding target}_{1/1/2008} &= 43,200 \times \ddot{a}_{65(7\%)}^{(12)} \times v_{.07}^{25} \\ &= 43,200 \times 8 \times 0.184249 = 63,677\end{aligned}$$

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance). There is no pre-funding balance as of 1/1/2008. The funding standard carryover balance as of 1/1/2008 is equal to the credit balance in the funding standard account as of 12/31/2007. This is \$4,000.

$$\text{Funding shortfall}_{1/1/2008} = 63,677 - (60,000 - 4,000) = 7,677$$

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (reduced by the total pre-funding balance if the employer elects to use any part of it for 2008 to reduce the minimum contribution requirement, but not by the funding standard carryover balance) is at least as large as the funding target. For purposes of the actuarial value of the assets, there is no adjustment since there is no pre-funding balance and the funding standard carryover balance is ignored.

The transition rule for 2008 allows that only 92% of the funding target is used in comparison to the actuarial value of the assets as long as the additional funding charge did not apply in 2007. There was no additional funding charge applicable in 2007 since it is given that the plan was not subject to IRC section 412(l) in 2007.

There is no shortfall amortization base for 2008 because the actuarial value of assets (\$60,000) is larger than 92% of the funding target ( $92\% \times 63,677 = 58,583$ ).

The minimum required contribution for 2008 as of 1/1/2008 is equal to the target normal cost. This is \$9,445. The contribution for 2008 of \$30,000 was deposited on 1/1/2008. Therefore, the contribution in excess of the minimum required contribution is equal to \$20,555 ( $\$30,000 - \$9,445$ ).

IRC section 430(f)(8) allows the employer to elect to apply the excess of the contribution over the minimum required contribution as an addition to the pre-funding balance. Exam general condition 29 indicates that the employer is assumed to elect to apply excess contributions to the pre-funding balance. Therefore, there is an addition to the pre-funding balance of \$20,555. IRC section 430(f)(8)(B)(ii) indicates that interest must be credited to the next valuation date using the plan effective interest rate for the year that the excess contribution was made. The plan effective rate for 2008 is 7%, since Smith is the only participant, and only the segment 3 interest rate of 7% was used to value Smith's benefits.

$$\text{Pre-funding balance as of 1/1/2009} = \$20,555 \times 1.07 = \$21,994$$

Answer is B.

### Question 3

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account.

The target normal cost and funding target must be developed. The target normal cost is equal to the present value of the difference between the 12/31/2009 accrued benefit (taking into account the 2% expected salary increase for 2009) and the 1/1/2009 accrued benefit (ignoring the expected salary increase for 2009).

$$1/1/2009 \text{ accrued benefit} = 2.5\% \times \$60,000 \times 16 \text{ years of service} = \$24,000$$

$$12/31/2009 \text{ accrued benefit} = 2.5\% \times \$60,000 \times 1.02 \times 17 \text{ years of service} = \$26,010$$

In determining the present value, the segment interest rates must be used. Smith is 43 as of 1/1/2009. The third segment interest rate is applicable for all payments made beginning with the 21<sup>st</sup> year after the valuation date. Since Smith's first benefit payment will be at age 65 (the assumed retirement age according to the exam general conditions), only the third segment interest rate is applicable for all benefit payments.

$$\begin{aligned} \text{Target normal cost}_{1/1/2009} &= (26,010 - 24,000) \times \ddot{a}_{65(8\%)}^{(12)} \times v_{.08}^{22} \\ &= 2,010 \times 8 \times 0.183941 = 2,958 \end{aligned}$$

The funding target is equal to the present value of the 1/1/2009 accrued benefit (ignoring the expected salary increase for 2009). In determining the present value, the segmented interest rates must be used in the same manner as for the target normal cost.

$$\begin{aligned} \text{Funding target}_{1/1/2009} &= 24,000 \times \ddot{a}_{65(8\%)}^{(12)} \times v_{.08}^{22} \\ &= 24,000 \times 8 \times 0.183941 = 35,317 \end{aligned}$$

The funding target must next be developed taking into account future salary increases (for purposes of the cushion amount). The accrued benefit as of 1/1/2009 taking future salary increases into account is:

$$1/1/2009 \text{ accrued benefit} = 2.5\% \times \$60,000 \times 1.02^{22} \times 16 \text{ years of service} = \$37,104$$

The increase in the funding target if the future salary increases had been assumed is:

$$\begin{aligned}\text{Funding target increase}_{1/1/2009} &= (37,104 - 24,000) \times \ddot{a}_{65(8\%)}^{(12)} \times v_{.08}^{22} \\ &= 13,104 \times 8 \times 0.183941 = 19,283\end{aligned}$$

The cushion amount is:

$$\text{Cushion amount} = (50\% \times 35,317) + 19,283 = 36,942$$

The IRC section 404(o)(2)(A) deductible limit is:

$$\$2,958 + \$35,317 + \$36,942 - \$40,000 = \$35,217$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets. The funding target and target normal cost determined using the at-risk assumptions are based upon the earliest possible retirement age for those within 11 years of retirement, and the most valuable optional form of benefit. Since there is no early retirement provision or optional benefit in this question, the at-risk assumptions will not produce any change in the funding target or target normal cost. IRC section 404(o)(2)(B) will not produce a larger deductible limit than the \$35,217 already determined.

Answer is E.

One final note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the last day of the plan year. Without regulations, it is not clear whether the \$35,217 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if \$35,217 is given interest at the plan effective rate of 8% to the end of the year, the answer still falls within the same answer range.

## Question 4

The funding standard carryover balance is not used to reduce the 2008 minimum required contribution. IRC section 430(f)(8) provides that the balance is adjusted to the next valuation date (1/1/2009) based upon the actual investment experience of the plan for 2008. Since the plan had a 10% decline in asset value in 2008, the funding standard carryover balance also declines by 10%.

$$\text{Funding standard carryover balance}_{1/1/2009} = \$50,000 \times 0.9 = \$45,000$$

The prefunding balance as of 1/1/2009 must be developed. The increase in the prefunding balance as of 1/1/2009 is based upon the excess of the contributions for 2008 over the minimum required contribution as of 1/1/2008. (Note that exam general condition 29 indicates that the plan sponsor elects to credit all contributions in excess of the minimum to the prefunding balance.) Since there was no shortfall amortization base created in 2008, the minimum required contribution is equal to the target normal cost of \$200,000. The contribution for 2008 was \$240,000, deposited on 12/31/2008. IRC section 430(j)(2) requires that any contribution made on a date other than the valuation date be adjusted with interest at the plan effective rate for the year (6.25% for 2008). The interest-adjusted contribution for 2008 is:

$$\$240,000 \div 1.0625 = \$225,882$$

The excess contribution for 2008 is:

$$\$225,882 - \$200,000 = \$25,882$$

The addition to the prefunding balance as of 1/1/2009 is equal to the excess contribution, adjusted with interest at the 2008 plan effective rate to 1/1/2009 (see IRC section 430(f)(6)(B)(ii)).

$$\text{Prefunding balance}_{1/1/2009} = \$25,882 \times 1.0625 = \$27,500$$

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance).

$$\text{Funding shortfall}_{1/1/2009} = \$3,200,000 - (\$2,900,000 - \$45,000 - \$27,500) = \$372,500$$

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (reduced by the total pre-funding balance if the employer elects to use any part of it for 2009 to reduce the minimum contribution requirement, but not by the funding standard carryover balance) is at least as large as the funding target. Exam general condition 31 indicates that the employer is assumed to apply the prefunding balance and funding standard carryover balance to the minimum required contribution, so the assets are reduced by the prefunding balance for this purpose.

The transition rule for 2009 allows that only 94% of the funding target is used in comparison to the actuarial value of the assets as long as the additional funding charge did not apply in 2007 (assumed according to exam general condition 36) and the plan was exempt from creating a shortfall base in 2008 (as is given in the question).

A shortfall amortization base must be created for 2009 because the actuarial value of assets reduced by the prefunding balance ( $\$2,900,000 - \$27,500 = \$2,872,500$ ) is smaller than 94% of the funding target ( $94\% \times \$3,200,000 = \$3,008,000$ ).

The funding shortfall amortization base for 2009 is equal to the funding shortfall of \$372,500.

Answer is D.

## Question 5

The top heavy ratio for 2009 is equal to the ratio of the present value of accrued benefits (or account balances for defined contribution plans) of the key employees to the present value of accrued benefits for all employees as of the 2008 valuation date. It is first necessary to determine the key employees for that prior year (2008).

IRC section 416(i)(1) defines a key employee to be anyone who satisfies any of the following rules:

- (i) Owns more than 5% of the company.
- (ii) Owns more than 1% of the company and earns more than \$150,000.
- (iii) Is an officer of the company and earns more than \$130,000 (indexed to \$150,000 in 2008).

For the 2008 year, employees 1 and 2 own more than 5% and are key employees. Since no other employees have ownership or are officers, only employees 1 and 2 are key employees for 2008.

In addition, employee 3 is a former key employee as employee 3 owned more than 5% prior to 2007. IRC section 416(g)(4)(B) specifies that the benefits of former key employees are not taken into account in determining the top-heavy ratio, so employee 3 can be ignored.

Finally, rollover accounts from an unrelated employer are not taken into account for purposes of the top heavy ratio according to IRC section 416(g)(A) and IRS regulation 1.416-1, Q&A T-32. The rollover accounts given in this question can be ignored.

Multiple plans of an employer must be aggregated if there is at least one key employee in each plan (IRC section 416(g)(2)). Both the defined benefit present value of accrued benefits and the profit sharing account balances must be used to determine the top heavy ratio.

Top heavy ratio =

$$\frac{300,000 + 400,000 + 350,000}{300,000 + 400,000 + 350,000 + 100,000 + 180,000 + 60,000 + 80,000 + 10,000 + 30,000}$$

= .6954, or 69.54%

Answer is B.

## Question 6

This plan has an initial unfunded liability of \$400,000 and possibly many years of experience gains or losses since it became effective in 1990. However, in looking at the 2008 valuation results, the ERISA full funding limitation is equal to \$0, as follows:

$$\begin{aligned} \text{2008 ERISA full funding limitation} &= (\text{Accrued liability} + \text{Normal cost} - \text{Assets}) \times 1.07 \\ &= (2,600,000 + 200,000 - 2,800,000) \times 1.07 \\ &= 0 \end{aligned}$$

The full funding limitation is equal to the greater of the ERISA full funding limitation and the RPA'94 full funding limitation. There is not enough information provided to determine the RPA'94 full funding limitation, and general exam condition 45 indicates that the RPA'94 full funding limitation is to be ignored if there is not sufficient information to determine it.

Therefore, the 2008 full funding limitation is equal to \$0, and all amortization bases in effect as of 1/1/2008 are deemed to be fully amortized.

For the 2009 valuation, the experience gain or loss must be determined (this is determined prior to application of the 2009 plan amendment). Revenue Ruling 81-213 indicates that for the year following the application of the full funding limitation, the expected unfunded accrued liability is deemed to be \$0. The actual unfunded accrued liability is:

$$\begin{aligned} 1/1/2009 \text{ UAL} &= \text{Accrued liability} - \text{Actuarial assets} = \$3,100,000 - \$3,000,000 \\ &= \$100,000 \end{aligned}$$

Note that since the full funding limitation for 2008 was \$0, no contribution was made for 2008, and the credit balance as of 12/31/2007 was \$0, there is no credit balance as of 1/1/2009.

The only other amortization base that must be created is equal to the increase in the unfunded accrued liability due to the plan amendment. This increase is:

$$\frac{70 - 65}{65} \times \$3,100,000 = \$238,462$$

The minimum required contribution is equal to the sum of the normal cost and the 15-year amortization of the two new bases created on 1/1/2009.

$$\text{Normal cost}_{1/1/2009} = \$250,000 \times (70/65) = \$269,231$$

$$\begin{aligned} \text{Minimum required contribution}_{1/1/2009} &= \$269,231 + \frac{\$100,000}{\ddot{a}_{\overline{15}|}} + \frac{\$238,462}{\ddot{a}_{\overline{15}|}} \\ &= \$269,231 + \$10,261 + \$24,469 \\ &= \$303,961 \end{aligned}$$

Answer is B.

### Question 7

Revenue Ruling 86-48 states that for purposes of determining liabilities in the case of a spin-off, all pension benefits must be considered, including early retirement subsidies, regardless of whether the eligibility requirements have yet to be satisfied.

The statement is false.

Answer is B.

## Question 8

The minimum required contribution for 2009 is equal to the target normal cost for 2009 plus the amortization of the 2008 funding shortfall and the amortization of the 2009 funding shortfall amortization base. The 2008 funding shortfall is amortized based upon the 2008 segmented interest rates. This amortization is:

$$\text{2008 funding shortfall amortization installment} = \$300,000/6.0363 = \$49,699$$

Any new shortfall amortization base is equal to the difference between the current funding shortfall and the outstanding balance of any existing shortfall amortization bases from prior years (see IRC section 430(c)(3)). Since shortfall amortization bases are amortized over 7 years (see IRC section 430(c)(2)(B)), there are 6 years left to amortize the 1/1/2008 shortfall amortization base.

The outstanding balance of the 1/1/2008 shortfall amortization base must be determined using the segmented interest rates used for the 2009 valuation (see IRC section 430(h)(2)(C)). The segment 1 interest rate applies to payments that are made within 5 years of the valuation date, the segment 2 interest rate applies to payments that are made more than 5 years and no more than 20 years from the valuation date, and the segment 3 interest rate applies to payments made more than 20 years from the valuation date. Since there are only 6 payments left to amortize the 1/1/2008 shortfall amortization base, only the first and second segment rates will be used. The segment 1 interest rate is 6.5%, and the segment 2 interest rate is 7.5%.

Outstanding balance of 1/1/2008 shortfall amortization base on 1/1/2009

$$= \$49,699 \times (\ddot{a}_{\overline{5}|6.5\%} + v_{7.5\%}^5) = \$49,699 \times 5.1224 = \$254,578$$

New shortfall base as of 1/1/2009 = \$200,000 – \$254,578 = (\$54,578)

$$\begin{aligned} \text{Minimum required contribution as of 1/1/2009} &= \$30,000 + \$49,699 - (\$54,578/5.7703) \\ &= \$70,241 \end{aligned}$$

The funding standard carryover balance and the prefunding balance are each \$0, so the minimum required contribution is also the smallest amount that satisfies the minimum funding standard.

Answer is D.

### **Question 9**

The assertion is false. There is no such rule under IRC section 404(o) that limits the deduction for a single employer plan to 150% of the funding target less the actuarial value of assets.

The reason is true. The rule under IRC section 404(a)(1)(D) that allows for the deduction based on 140% of current liability applies only to multiemployer plans.

Answer is D.

### **Question 10**

IRC section 430(j)(3)(C) indicates that for a calendar year plan, the quarterly installments are due on April 15, July 15, October 15, and January 15 of the following year. For a 2009 plan year, this would be 4/15/2009, 7/15/2009, 10/15/2009, and 1/15/2010.

The statement is true.

Answer is A.

## Question 11

The minimum required contribution must be developed for 2009. The target normal cost is equal to the present value of the difference between the 12/31/2009 accrued benefit (taking into account the 1% expected salary increase for 2009) and the 1/1/2009 accrued benefit (ignoring the expected salary increase for 2009).

1/1/2009 accrued benefit

$$= 1.5\% \times \$50,000 \times 20 \text{ years of service} \times 100 \text{ participants} = \$1,500,000$$

12/31/2009 accrued benefit

$$= 1.5\% \times \$50,000 \times 1.01 \times 21 \text{ years of service} \times 100 \text{ participants} = \$1,590,750$$

In determining the present value, the segment interest rates must be used. The participants are 45 as of 1/1/2009. The third segment interest rate is applicable for all payments made beginning with the 21<sup>st</sup> year after the valuation date. Since the participants' first benefit payment will be at age 65 (the assumed retirement age according to the exam general conditions), only the third segment interest rate is applicable for all benefit payments.

$$\begin{aligned} \text{Target normal cost}_{1/1/2009} &= (1,590,750 - 1,500,000) \times \ddot{a}_{65(7\%)}^{(12)} \times v_{.07}^{20} \\ &= 90,750 \times 10 \times 0.258419 = 234,515 \end{aligned}$$

The funding target is equal to the present value of the 1/1/2009 accrued benefit (ignoring the expected salary increase for 2009). In determining the present value, the segmented interest rates must be used in the same manner as for the target normal cost.

$$\begin{aligned} \text{Funding target}_{1/1/2009} &= 1,500,000 \times \ddot{a}_{65(7\%)}^{(12)} \times v_{.07}^{20} \\ &= 1,500,000 \times 10 \times 0.258419 = 3,876,285 \end{aligned}$$

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance). There is no pre-funding balance as of 1/1/2009. The funding standard carryover balance as of 1/1/2008 is equal to the credit balance in the funding standard account as of 12/31/2007. This is \$0, so there is no funding standard carryover balance on 1/1/2009.

$$\text{Funding shortfall}_{1/1/2009} = 3,876,285 - 3,700,000 = 176,285$$

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (reduced by the total pre-funding balance if the employer elects to use any part of it for 2009 to reduce the minimum contribution requirement, but not by the funding standard carryover balance) is at least as large as the funding target. For purposes of the actuarial value of the assets, there is no adjustment since there is no pre-funding balance.

The transition rule for 2009 allows that only 94% of the funding target is used in comparison to the actuarial value of the assets as long as the additional funding charge did not apply in 2007 and the plan was exempt from creating a shortfall amortization base in 2008. There was no additional funding charge applicable in 2007 since it is given that the plan was not subject to IRC section 412(l) in 2007, and there was no shortfall amortization base created in 2008.

There is no shortfall amortization base for 2009 because the actuarial value of assets (\$3,700,000) is larger than 94% of the funding target ( $94\% \times 3,876,285 = 3,643,708$ ).

The minimum required contribution for 2009 as of 1/1/2009 is equal to the target normal cost. This is \$234,515. This is also the smallest amount that satisfies the minimum funding standard since there is no prefunding balance or funding standard carryover balance.

Answer is C.

## Question 12

IRC section 430(c) provides rules to determine the shortfall amortization installment with regard to a particular shortfall amortization base. This base is not re-amortized in future years, so the amount of the installment in 2009 with regard to a 2008 base is the same as the amount of the installment in 2008. The only exception to this rule is that if the funding target attainment percentage is ever greater than or equal to 100%, then all prior shortfall amortization bases are considered to be fully amortized (IRC section 430(c)(6)). The funding target attainment percentage is 80%, so the 2008 shortfall amortization base is not fully amortized.

The statement is false.

Answer is B.

### Question 13

The gain or loss due to early retirement is equal to the difference between the funding target had Smith not retired, and the present value of the early retirement benefit that Smith will receive.

The accrued benefit as of 1/1/2009 is:

$$1\% \times \$100,000 \times 20 \text{ years of service} = \$20,000$$

This is reduced by 5% for each year prior to age 65 that Smith has retired. Smith has retired at age 59, so the reduction is 30% ( $5\% \times 6$  years).

$$\text{Early retirement benefit} = \$20,000 \times (1 - .30) = \$14,000$$

In determining the present value, the segment interest rates must be used. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2009 through 2013), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2014 through 2028), and the segment 3 interest rate is used for the remaining payments (2029 and later). For purposes of valuing the early retirement benefit, which is payable immediately at age 59, each segment interest rate must be taken into account, depending upon which year the payment is to be made.

Present value of early retirement benefit

$$\begin{aligned} &= \$14,000 \times \left[ \frac{N_{59@seg1}^{(12)} - N_{64@seg1}^{(12)}}{D_{59@seg1}} + \frac{N_{64@seg2}^{(12)} - N_{79@seg2}^{(12)}}{D_{59@seg2}} + \frac{N_{79@seg3}^{(12)}}{D_{59@seg3}} \right] \\ &= \$14,000 \times \left[ \frac{702,264 - 471,496}{52,739} + \frac{236,751 - 41,247}{30,147} + \frac{18,721}{17,324} \right] \\ &= \$167,179 \end{aligned}$$

For purposes of valuing the funding target, the assumed retirement age of 65 is used (note general exam condition 18 states that the assumed retirement age is the normal retirement age, unless otherwise specified). Since there is an assumed pre-retirement mortality decrement, the commutation functions can be used to discount prior to age 65. Since the first payment (at age 65) will be made in 2015, only the segment 2 and segment 3 interest rates are used.

$$\begin{aligned}
 \text{Funding target} &= \$20,000 \times \left[ \frac{N_{65@seg2}^{(12)} - N_{79@seg2}^{(12)}}{D_{59@seg2}} + \frac{N_{79@seg3}^{(12)}}{D_{59@seg3}} \right] \\
 &= \$20,000 \times \left[ \frac{215,712 - 41,247}{30,147} + \frac{18,721}{17,324} \right] \\
 &= \$137,356
 \end{aligned}$$

There is a loss since the actual liability upon early retirement is more than the funding target had Smith not retired.

$$\text{Loss due to early retirement} = \$167,179 - \$137,356 = \$29,823$$

Answer is A.

## Question 14

The accrued liability under the unit credit funding method is equal to the present value of the 1/1/2009 accrued benefit.

$$\begin{aligned} \text{1/1/2009 accrued benefit} &= (\$40 \times 9 \text{ years of service}) + (\$60 \times 9 \text{ years of service}) \\ &= \$900 \text{ per month, or } \$10,800 \text{ per year} \end{aligned}$$

This accrued benefit is reduced for early retirement by 8% for each year that retirement precedes age 65. There is a 50% probability of retirement at age 62 that is assumed for funding purposes. The accrued benefit payable at early retirement age 62 is:

$$\text{Early retirement benefit} = \$10,800 \times [1 - (.08 \times 3 \text{ years})] = \$8,208$$

Note that the assumed probability of retiring at age 65 is also 50%.

Smith is age 49, 13 years prior to the early retirement age of 62 and 16 years before the normal retirement age of 65.

$$\begin{aligned} \text{Accrued liability}_{1/1/2009} &= (\$8,208 \times \ddot{a}_{62}^{(12)} \times v^{13} \times .50) + (\$10,800 \times \ddot{a}_{65}^{(12)} \times v^{16} \times .50) \\ &= (\$8,208 \times 11.42 \times 0.468839 \times .50) \\ &\quad + (\$10,800 \times 10.65 \times 0.393646 \times .50) \\ &= \$21,973 + \$22,639 = \$44,612 \end{aligned}$$

Answer is B.

## Question 15

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. Since the plan is not at-risk, the funding target (\$1,400,000) and target normal cost (\$100,000) without regard to the at-risk assumptions are used.

The cushion amount is:

$$\text{Cushion amount} = (50\% \times \$1,400,000) + (\$1,600,000 - \$1,400,000) = \$900,000$$

The IRC section 404(o)(2)(A) deductible limit is:

$$\$100,000 + \$1,400,000 + \$900,000 - \$1,200,000 = \$1,200,000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets. These are the target normal cost and funding target using at-risk assumptions.

The IRC section 404(o)(2)(B) deductible limit is:

$$\$160,000 + \$2,500,000 - \$1,200,000 = \$1,460,000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is \$1,460,000.

Answer is D.

Note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the last day of the plan year. Without regulations, it is not clear whether the \$1,460,000 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if \$1,460,000 is given interest at the plan effective rate of 6% to the end of the year, the answer still falls within the same answer range.

Alternative solution:

General exam condition 48 indicates that the at-risk funding target and normal cost do not include the 5-year transition under IRC section 430(i)(5). Without regulations for IRC section 404(o), it is not even clear whether this phase-in should even apply under IRC section 404(o)(2)(B). However, if it does, then 2009 would be the assumed first year of the plan being at-risk, so the transitioned funding target and target normal cost under IRC section 430(i)(5) would include 20% of the at-risk results plus 80% of the not at-risk results. The transitioned numbers are:

$$\text{Funding target} = (\$1,400,000 \times 80\%) + (\$2,500,000 \times 20\%) = \$1,620,000$$

$$\text{Target normal cost} = (\$100,000 \times 80\%) + (\$160,000 \times 20\%) = \$112,000$$

Using the transitioned target normal cost and funding target, the IRC section 404(o)(2)(B) is:

$$\$112,000 + \$1,620,000 - \$1,200,000 = \$532,000$$

The deductible limit would then be equal to the IRC section 404(o)(2)(A) limit of \$1,200,000, which would be answer choice A. Note that this is a less desirable answer on two counts. First, without regulations, it is not clear whether the transition rule applies. And since without regulations it is unclear as to whether this limit is to be increased with interest to the end of the fiscal year, if \$1,200,000 is increased with 6% interest, it increases to \$1,272,000, which is in answer range B.

As of this writing, the Joint Board has determined answer choice B to be an acceptable answer to this question, implying that they believe that interest should be given to the end of the fiscal year using the plan effective rate for purposes of the deductible limit. Consideration is currently being given for also accepting answer choice A. Please check the ASM web site for any updates concerning this issue.

## **Question 16**

For years prior to 2008, amortization bases for multiemployer plans that were created on account of plan amendments were amortized over 30 years. IRC section 431(b)(4) states that amortization bases amortized under IRC section 412(b) prior to 2008 shall continue to be amortized in the same manner as IRC section 412(b) required. Therefore, the outstanding balance as of 1/1/2008 is not re-amortized over 15 years. The statement is false.

Answer is B

## **Question 17**

A multiemployer plan is defined to be in critical status under IRC section 432(b)(2)(B)(ii) if the plan is projected to have an accumulated funding deficiency in any of the next 3 years. The actuary has determined that an accumulated funding deficiency will occur at the end of 2010, which is within the 3-year period (actually extended to 4 years since the plan's funded percentage is less than or equal to 65%). IRC section 432(b)(2)(1) states that a plan can be in endangered status only if it is not in critical status. Therefore, the plan is not in "seriously endangered" status for 2008. The statement is false.

Answer is B.

## Question 18

The minimum required contribution for 2009 is generally equal to the target normal cost plus the amortization of the funding shortfall bases.

Under IRC section 430(c)(4), the funding shortfall is equal to the excess (if any) of the funding target over the actuarial value of the plan assets (reduced by the funding standard carryover balance and the prefunding balance). Using the information provided in the question, the funding shortfall as of 1/1/2009 is:

$$\begin{aligned}\text{Funding shortfall} &= \text{Funding target} - (\text{Actuarial assets} \\ &\quad - \text{Funding standard carryover balance} - \text{Prefunding balance}) \\ &= \$12,000,000 - (\$13,500,000 - \$720,000 - \$0) \\ &= (\$780,000)\end{aligned}$$

If the funding shortfall is less than or equal to zero, then there is no new funding shortfall amortization base created, and all prior amortization bases are considered to be fully amortized (IRC section 430(c)(6)).

In addition, the minimum required contribution is equal to the target normal cost, reduced by the excess of the actuarial value of assets (reduced by the funding standard carryover balance and prefunding balance) over the funding target (IRC section 430(a)(2)).

$$\begin{aligned}\text{Minimum required contribution}_{1/1/2009} &= \$2,100,000 - ((\$13,500,000 - \$720,000) - \$12,000,000) \\ &= \$1,320,000\end{aligned}$$

The minimum required contribution can be reduced by the funding standard carryover balance in order to determine the smallest amount that satisfies the minimum funding standard (see general exam condition 35). This is:

$$\$1,320,000 - \$720,000 = \$600,000$$

The initial contribution of \$525,000 is contributed on 7/1/2009, and the additional contribution (\$X) is not contributed until 1/1/2010. IRC section 430(j)(2) states that contributions paid on a date other than the valuation date are adjusted with interest at the plan effective rate for the year (7% for 2009).

$$\$X = [\$600,000 - (\$525,000 \div 1.07^{6/12})] \times 1.07 = \$98,936$$

Answer is E.

### Question 19

Smith is age 45 on 1/1/2009. Retirement age is assumed to be age 65 (general exam condition 6). For payments beginning more than 20 years after the valuation date, the segment 3 interest rate of 6% is used to value the benefits.

$$\begin{aligned}\text{Lump sum} &= \$36,000 \times \ddot{a}_{65(6\%)}^{(12)} \times v_{6\%}^{20} \\ &= \$36,000 \times 10.87 \times 0.311805 \\ &= \$122,016\end{aligned}$$

Answer is C.

### Question 20

The prefunding balance cannot be used to reduce the minimum required contribution until the funding standard carryover balance is zero (IRC section 430(f)(3)(B)). Since the funding standard carryover balance is not zero, it must be used before the prefunding balance. The statement is false.

Answer is B.

## Question 21

The minimum required contribution for 2009 is equal to the target normal cost plus the amortization of the funding shortfall bases. The target normal cost and funding target are given prior to the application of the plan amendment. The revised target normal cost and funding target under the plan amendment are:

$$\text{Target normal cost} = \$31,750 \times (35/30) = \$37,042$$

$$\text{Funding target} = \$1,000,000 \times (35/30) = \$1,166,667$$

Under IRC section 430(c)(4), the funding shortfall is equal to the excess (if any) of the funding target over the actuarial value of the plan assets (reduced by any credit balances). There is no funding standard carryover balance or prefunding balance as of 1/1/2009.

$$\text{Funding shortfall} = \$1,166,667 - \$950,000 = \$216,667$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That exemption is not satisfied as of 1/1/2009 (the \$1,166,667 funding target exceeds the \$950,000 actuarial value of assets). There is a transition rule available for 2009 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 94% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(1) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is not the case in this question, since exam general condition 36 states that, unless otherwise indicated, the additional funding charge has never applied. The transition is also not available if there was a shortfall amortization base created in 2008 (there was none created in this question). So, applying the transition rule, 94% of the funding target is \$1,096,667, which still exceeds the actuarial value of the assets, so the new funding shortfall amortization base is required.

The minimum required contribution as of 1/1/2009 is:

$$\begin{aligned} \text{Minimum}_{1/1/2009} &= \text{Target normal cost} + \text{Amortization of funding shortfall} \\ &= \$37,042 + (\$216,667/5.9982) = \$73,164 \end{aligned}$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution, reduced by the funding standard carryover and prefunding balances (see exam general condition 35). Since those amounts are zero, the smallest amount that satisfies the minimum funding standard is \$73,164.

Answer is D.

## Question 22

Smith's compensation must be limited to the IRC section 401(a)(17) maximum for each year. Using the table provided with the exam, Smith's compensation history and limitation history is:

<u>Year</u>	<u>Salary</u>	<u>401(a)(17) limitation</u>
2003	\$300,000	\$200,000
2004	250,000	205,000
2005	225,000	210,000
2006	225,000	220,000
2007	230,000	225,000
2008	235,000	230,000

Smith's high consecutive 5-year average compensation (limiting each year's salary to the IRC section 401(a)(17) maximum) is:

$$\frac{\$205,000 + \$210,000 + \$220,000 + \$225,000 + \$230,000}{5} = \$218,000$$

The accrued benefit as of 12/31/2008 using the plan's benefit formula is:

$$\text{Plan accrued benefit} = 11\% \times \$218,000 \times 6 \text{ years of service} = \$143,880$$

The accrued benefit must be limited if the IRC section 415 maximum benefit is less than the plan accrued benefit. The IRC section 415(b) compensation limitation is equal to 100% of the high consecutive 3-year average salary (with salary limited to the maximum salary under IRC section 401(a)(17)), reduced for years of service less than 10. Smith has only 6 years of service as of 12/31/2008, so the compensation limitation of IRC section 415(b) is reduced to 6/10 of the maximum.

$$\begin{aligned} \text{IRC section 415 compensation limit} &= \frac{\$220,000 + \$225,000 + \$230,000}{3} \times \frac{6}{10} \\ &= \$135,000 \end{aligned}$$

The IRC section 415 dollar limitation for 2008 is \$185,000. This is reduced for years of plan participation less than 10. Smith entered the plan on the effective date of 1/1/2004, and has only 5 years of plan participation as of 12/31/2008, so the dollar limitation of IRC section 415(b) is reduced to 5/10 of the maximum. In addition, Smith's retirement date is 1/1/2009 (after 5 years of plan participation). The dollar limit is increased actuarially for retirement after age 65. The actuarial increase is based upon either the plan actuarial assumptions, or a 5% interest rate and the applicable mortality table (under IRC section 417(e)(3)). Since only one set of assumptions are provided, it must be assumed that they provide the smallest result. The accumulation from age 65 to age 70 includes mortality if there is no pre-retirement death benefit, and is done on an interest only basis if there is any death benefit. There is no information provided in this question about a death benefit, and there is no general exam condition providing guidance on the assumption of a pre-retirement death benefit. If the accumulation is done using interest only the result will be smaller than if the accumulation includes a mortality decrement, so for the time being, the equivalence will be done on an interest only basis.

Equivalent IRC section 415 dollar limit at age 70

$$= \$185,000 \times \frac{5}{10} \times \frac{N_{65}^{(12)}}{D_{65}} \times (1.05^5) \div \frac{N_{70}^{(12)}}{D_{70}} = \$135,721$$

The overall IRC section 415(b) limitation is equal to the smaller of the compensation maximum or the dollar maximum. In this case, the compensation maximum of \$135,000 is smaller. Note that had mortality accumulation been used for the dollar limit, the result would have been larger than \$135,721, and the compensation maximum would still have been smaller.

The accrued benefit is equal to the smaller of the plan accrued benefit (\$143,880) or the IRC section 415(b) limit (\$135,000). This is \$135,000.

The monthly accrued benefit is \$11,250 (\$135,000/12).

Answer is C.

### Question 23

- I. At-risk status under IRC section 430(i)(4) is determined based upon the funding target attainment percentage for the prior year. IRC section 430(d)(2)(A) states that both the funding standard carryover balance and the prefunding balance are subtracted from the actuarial assets for this purpose. Note the cross reference to IRC section 430(f)(4)(B). The statement is true.
- II. For purposes of the exemption from establishing a shortfall amortization base under IRC section 430(c)(5)(A), the actuarial assets are reduced only by the prefunding balance, provided the employer has elected to use all or part of the prefunding balance to reduce the minimum required contribution for the year. Note the cross reference to IRC section 430(f)(4)(A). The statement is false.
- III. IRC section 430(f)(3)(C) provides that an employer may elect to apply the current year funding standard carryover balance and/or prefunding balance if the actuarial assets for the prior year (reduced by the prior year prefunding balance only) is at least 80% of the prior year's funding target. Note the cross reference to IRC section 430(f)(4)(C). The statement is false.

Answer is A.

### Question 24

Any unused portion of the prefunding balance is increased to the next valuation date with interest based upon the actual rate of return on the plan assets for the year. See IRC section 430(f)(8). The statement is false.

Answer is B.

## Question 25

Before the 2009 valuation can be done, it is necessary to determine the amount of the 1/1/2008 funding shortfall, and the amortization of that shortfall. The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance). There is no prefunding balance on 1/1/2008, so the only reduction in the assets is for the funding standard carryover balance.

$$\text{Funding shortfall}_{1/1/2008} = \$1,270,000 - (\$960,000 - \$55,000) = \$365,000$$

The plan is exempt from creating a shortfall amortization base if the actuarial value of the assets (not reduced by the funding standard carryover balance) is at least as large as the funding target. The transition rule for 2008 allows that only 92% of the funding target is used in comparison to the actuarial value of the assets as long as the additional funding charge did not apply in 2007 (the additional funding charge did not apply to this plan since it is given that the plan was not subject to IRC section 412(l) for 2007).

A shortfall amortization base was created for 2008 because the actuarial value of assets (\$960,000) is smaller than 92% of the funding target ( $92\% \times \$1,270,000 = \$1,168,400$ ).

$$\text{Amortization of the 1/1/2008 funding shortfall} = \$365,000 / 5.9982 = \$60,852$$

The funding shortfall as of 1/1/2009 is:

$$\text{Funding shortfall}_{1/1/2009} = \$1,400,000 - (\$1,100,000 - \$15,000 - \$10,000) = \$325,000$$

Any new shortfall amortization base is equal to the difference between the current funding shortfall and the outstanding balance of any existing shortfall amortization bases from prior years (see IRC section 430(c)(3)). Since shortfall amortization bases are amortized over 7 years (see IRC section 430(c)(2)(B)), there are 6 years left to amortize the 1/1/2008 shortfall amortization base.

The outstanding balance of the 1/1/2008 shortfall amortization base must be determined using the segmented interest rates used for the 2009 valuation (see IRC section 430(h)(2)(C)). In this case, the amortization factors are based upon the same rates for both 2008 and 2009.

Outstanding balance of 1/1/2008 shortfall amortization base on 1/1/2009

$$= \$60,852 \times 5.2932 = \$322,102$$

$$\text{New shortfall base as of 1/1/2009} = \$325,000 - \$322,102 = \$2,898$$

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$$\begin{aligned}\text{Minimum required contribution as of 1/1/2009} &= \$58,500 + \$60,852 + (\$2,898/5.9982) \\ &= \$119,835\end{aligned}$$

Since the employer elects not to offset the minimum required contribution by the funding standard carryover balance, the prefunding balance cannot be used to offset the minimum since IRC section 430(f)(3)(B) does not allow the prefunding balance to be used if the funding standard carryover balance is greater than zero. Therefore, the smallest amount that satisfies the minimum funding standard for 2009 as of 1/1/2009 is \$119,835.

$$\$X = \$119,835$$

Answer is D.

Note concerning the market value of assets: Since the market value of assets was provided both for 1/1/2008 and 1/1/2009, it is important to make certain that the actuarial value is neither less than 90% nor more than 110% of the market value of the assets (as required by IRC section 430(g)(3)(B)(iii)). This requirement is satisfied (in each case, the actuarial value is not less than 90% of the market value) in this question.

## Question 26

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2009 is:

$$\text{Funding shortfall}_{1/1/2009} = \$341,000 - (\$375,000 - \$5,000 - \$10,000) = (\$19,000)$$

When the funding shortfall is less than or equal to zero, there is no new shortfall amortization base for the year, and all prior bases are deemed to be fully amortized (IRC section 430(c)(6)). The shortfall amortization base for 2008 of \$20,000 is deemed to be fully amortized.

The minimum required contribution is equal to the target normal cost, reduced by the excess of the actuarial value of assets (reduced by the funding standard carryover balance and the prefunding balance) over the funding target. (See IRC section 430(a)(2).)

$$\begin{aligned} \text{Minimum required contribution as of 1/1/2009} \\ = \$36,000 - ((\$375,000 - \$5,000 - \$10,000) - \$341,000) = \$17,000 \end{aligned}$$

The employer is assumed to elect to offset the minimum required contribution by the funding standard carryover balance and the prefunding balance (general exam condition 31). Therefore, the smallest amount that satisfies the minimum funding standard for 2009 as of 1/1/2009:

$$\$X = \$17,000 - \$5,000 - \$10,000 = \$2,000$$

Answer is A.

Note concerning the market value of assets: Since the market value of assets was provided for 1/1/2009, it is important to make certain that the actuarial value is neither less than 90% nor more than 110% of the market value of the assets (as required by IRC section 430(g)(3)(B)(iii)). This requirement is satisfied (the actuarial value is not less than 90% of the market value) in this question.

## Question 27

The target normal cost is equal to the present value of the difference between the 12/31/2009 accrued benefit (taking into account the 4% expected salary increase for 2009) and the 1/1/2009 accrued benefit (ignoring the expected salary increase for 2009).

1/1/2009 accrued benefit =  $1.5\% \times \$120,000 \times 20$  years of service = \$36,000

12/31/2009 accrued benefit =  $1.5\% \times \$120,000 \times 1.04 \times 21$  years of service = \$39,312

In determining the present value, the segment interest rates must be used. Smith is 60 as of 1/1/2009. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2009 through 2013), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2014 through 2028), and the segment 3 interest rate is used for the remaining payments (2029 and later). Since Smith's first benefit payment will be at age 65 on 1/1/2014 (under the original assumed retirement age assumption), the second segment interest rate is used for the first 15 years of benefit payments, and the third segment interest rate is applicable for all benefit payments beginning in 2029. Based upon the actuarial assumptions, pre-retirement mortality is the same as post-retirement mortality. The target normal cost determined using the original retirement age assumption of 65 is:

$$\begin{aligned} \text{Target normal cost}_{1/1/2009} &= (39,312 - 36,000) \times \left[ \frac{N_{65@seg2}^{(12)} - N_{80@seg2}^{(12)}}{D_{60@seg2}} + \frac{N_{80@seg3}^{(12)}}{D_{60@seg3}} \right] \\ &= 3,312 \times \left[ \frac{215,712 - 35,335}{28,267} + \frac{15,917}{16,092} \right] = 24,410 \end{aligned}$$

Smith's first benefit payment will be at age 62 on 1/1/2011 (under the amended assumed retirement age assumption). The first segment interest rate is used for the first 3 years of benefit payments, the second segment interest rate is used for the next 15 years of benefit payments, and the third segment interest rate is applicable for all benefit payments beginning in 2029. The assumed increase in the 2009 accrued benefit payable at age 62 must be reduced using the early retirement reduction factor.

$$\text{Reduced accrual} = (39,312 - 36,000) \times (1 - (4.5\% \times 3 \text{ years})) = 2,865$$

The target normal cost determined using the amended retirement age assumption of 62 is:

Target normal cost<sub>1/1/2009</sub>

$$\begin{aligned} &= 2,865 \times \left[ \frac{N_{62@seg1}^{(12)} - N_{65@seg1}^{(12)}}{D_{60@seg1}} + \frac{N_{65@seg2}^{(12)} - N_{80@seg2}^{(12)}}{D_{60@seg2}} + \frac{N_{80@seg3}^{(12)}}{D_{60@seg3}} \right] \\ &= 2,865 \times \left[ \frac{556,090 - 432,743}{49,921} + \frac{215,712 - 35,335}{28,267} + \frac{15,917}{16,092} \right] \\ &= 28,195 \end{aligned}$$

The increase in the target normal cost is:

$$\$28,195 - \$24,410 = \$3,785$$

Answer is C.

## Question 28

Smith's compensation must be limited to the IRC section 401(a)(17) maximum for each year. Using the table provided with the exam, Smith's compensation history and limitation history is:

<u>Year</u>	<u>Salary</u>	<u>401(a)(17) limitation</u>
2002	\$245,000	\$200,000
2003	238,000	200,000
2004	232,000	205,000
2005	228,000	210,000
2006	222,000	220,000
2007	228,000	225,000
2008	235,000	230,000

Smith's high consecutive 5-year average compensation (limiting each year's salary to the IRC section 401(a)(17) maximum) is:

$$\frac{\$205,000 + \$210,000 + \$220,000 + \$225,000 + \$230,000}{5} = \$218,000$$

The accrued benefit as of 12/31/2008 using the plan's benefit formula is:

$$\text{Plan accrued benefit} = 5\% \times \$218,000 \times 15 \text{ years of service} = \$163,500$$

The accrued benefit must be limited if the IRC section 415 maximum benefit is less than the plan accrued benefit. The IRC section 415(b) compensation limitation is equal to 100% of the high consecutive 3-year average salary (with salary limited to the maximum salary under IRC section 401(a)(17)), reduced for years of service less than 10. Smith has only 15 years of service as of 12/31/2008, so the compensation limitation of IRC section 415(b) is not reduced.

$$\text{IRC section 415 compensation limit} = \frac{\$220,000 + \$225,000 + \$230,000}{3} = \$225,000$$

The IRC section 415 dollar limitation for 2008 is \$185,000. This is reduced for years of plan participation less than 10. Smith entered the plan on his hire date of 1/1/1989, and has at least 10 years (actually more) of plan participation as of 12/31/2008, so the dollar limitation of IRC section 415(b) is not reduced. Retirement age is assumed to be age 65 (general exam condition 6), so there is no further reduction to the dollar limitation.

The overall IRC section 415 limit is equal to the smaller of the compensation limit or the dollar limit, which is the dollar limit of \$185,000.

The plan accrued benefit of \$163,500 is less than the IRC section 415 limit, so \$163,500 is the annual accrued benefit as of 12/31/2008.

Answer is D.

## Question 29

The outstanding balance of the amortization bases in effect prior to 2009 as of (1/1/2009) is equal to the sum of the individual outstanding balances of the pre-2008 bases. The initial base from the plan effective date of 1/1/2005 is being amortized over 30 years (with 26 years remaining as of 1/1/2009), and the 2007 experience loss is being amortized over 15 years (with 14 years remaining as of 1/1/2009 – note that it was first amortized on 1/1/2008). There are no other amortization bases prior to 2009.

$$\text{Outstanding balance} = (5,000 \times \ddot{a}_{\overline{26}|}) + (2,500 \times \ddot{a}_{\overline{14}|}) = 63,268 + 23,394 = 86,662$$

A new amortization base is created under the unit credit cost method when there is a plan amendment that increases or decreases the unfunded liability under the plan. This new base is equal to the difference between the actual unfunded accrued liability and the expected unfunded liability. The expected unfunded liability can be determined using the balance equation:

$$\begin{aligned} \text{Unfunded liability} &= \text{Outstanding balance} - \text{Credit balance} \\ &= 86,662 - 25,000 \\ &= 61,662 \end{aligned}$$

The actual unfunded accrued liability is equal to the accrued liability reflecting the plan amendment, less the actuarial value of the assets.

$$\text{Actual unfunded accrued liability} = 1,000,000 - 800,000 = 200,000$$

The loss due to the increase in the unfunded liability is:

$$200,000 - 61,662 = 138,338$$

This is amortized over 15 years under IRC section 431(b)(2)(B)(ii).

The minimum required contribution for 2009 as of 1/1/2009 is equal to the normal cost (after reflecting the plan amendment) plus the amortization charges associated with the three amortization bases. The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution, less the credit balance.

$$X = 75,000 + 5,000 + 2,500 + (138,338/\ddot{a}_{\overline{15}|}) - 25,000 = 57,500 + 14,195 = 71,695$$

Answer is D.

### Question 30

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2009 is:

$$\text{Funding shortfall}_{1/1/2009} = \$1,000,000 - \$700,000 = \$300,000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2009 (the \$1,000,000 funding target exceeds the \$700,000 actuarial value of assets). There is a transition rule available for 2009 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 94% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is not the case in this question, since exam general condition 36 states that, unless otherwise indicated, the additional funding charge has never applied. In addition, in order to use the transition rule for 2009, the shortfall amortization for 2008 must have been zero, which it was in this case. So, applying the transition rule, 94% of the funding target is \$940,000, which still exceeds the actuarial value of the assets, so the new funding shortfall amortization base is required.

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$$\begin{aligned}\text{Minimum}_{1/1/2009} &= \text{Target normal cost} + \text{Amortization of funding shortfall} \\ &= \$60,000 + (\$300,000/5.9982) \\ &= \$110,015\end{aligned}$$

There is no funding standard carryover balance or prefunding balance to reduce the minimum required contribution. The contribution of \$X must include interest at the 2009 plan effective rate to the date it is paid (3/1/2010) according to IRC section 430(j)(2).

$$\text{\$X} = \$110,015 \times 1.0575^{14/12} = \$117,430$$

Answer is C.

### Question 31

All plans of an employer with at least one key employee must be aggregated for purposes of the top heavy ratio (see IRC section 416(g)(2)(A)(i)). Since each plan has at least one key employee, the aggregated top heavy ratio should be used.

A plan is top heavy if the top heavy ratio is more than 60%. The plans are top heavy for years prior to 2004.

The top heavy minimum benefit in a defined benefit plan is 2% of the high consecutive 5-year average salary per year of plan participation while the plan is top heavy (years of participation is credited only for top heavy years). See IRC section 416(c)(1). The accrued benefit is equal to the greater of the plan formula accrued benefit or the top heavy minimum accrued benefit. Top heavy minimum benefits are required only for non-key employees.

Smith is a participant in plan A. Since Smith was hired on 1/1/2003 and is assumed to enter the plan immediately (see general exam condition 8), Smith only has one year of top heavy plan participation (2003).

The accrued benefit for Smith as of 12/31/2009 is:

Plan formula accrued benefit =  $1.50\% \times \$35,000 \times 7$  years of service = \$3,675

Top heavy minimum =  $2\% \times \$35,000 \times 1$  year of top heavy participation = \$700

The greater of these is \$3,675.

Jones is a participant in plan B. Since Jones was hired on 1/1/2000 and is assumed to enter the plan immediately (see general exam condition 8), Jones has four years of top heavy plan participation (2000 through 2003).

The accrued benefit for Jones as of 12/31/2009 is:

Plan formula accrued benefit =  $\$250 \times 10$  years of service = \$2,500

Top heavy minimum =  $2\% \times \$35,000 \times 4$  years of top heavy participation = \$2,800

The greater of these is \$2,800.

The sum of Smith and Jones' annual accrued benefit =  $\$3,675 + \$2,800 = \$6,475$

Answer is B.

## Question 32

### Smith

The plan accrued benefit as of 12/31/2008 is \$185,000. Although there is a reduction for early retirement, it only applies if the participant has less than 25 years of service. Smith has 30 years of service, so there is no early retirement reduction.

The accrued benefit must be limited if the IRC section 415 maximum benefit is less than the plan accrued benefit. The IRC section 415(b) compensation limitation is equal to 100% of the high consecutive 3-year average salary (with salary limited to the maximum salary under IRC section 401(a)(17)), reduced for years of service less than 10. Smith has 31 years of service as of 12/31/2008, so the compensation limitation of IRC section 415(b) is not reduced for service less than 10 years. For purposes of the high consecutive 3-year average salary, each salary for 2006 through 2008 must be limited to that year's IRC section 401(a)(17) limit.

$$\text{IRC section 415 compensation limit} = \frac{\$220,000 + \$225,000 + \$230,000}{3} = \$225,000$$

The IRC section 415 dollar limitation for 2008 is \$185,000. This is reduced for years of plan participation less than 10. Smith entered the plan on the effective date of 1/1/2001, and has only 8 years of plan participation as of 12/31/2008, so the dollar limitation of IRC section 415(b) is reduced to 8/10 of the maximum. In addition, Smith's retirement date is 12/31/2008 (at age 60). The dollar limit is reduced actuarially for retirement prior age 62. The decrease is based upon either the plan actuarial assumptions (the tabular plan early retirement factors since this is an early retirement age), or a 5% interest rate and the applicable mortality table (under IRC section 417(e)(3)), whichever provides the smaller result. Since Smith has at least 25 years of service, there is no early retirement factor, so the adjustment factor using plan assumptions is 1. Clearly, the smaller reduced dollar limit will come from the use of 5% interest and the applicable mortality table. The reduced dollar maximum from age 62 to age 60 using those assumptions is:

$$\$185,000 \times \frac{8}{10} \times \frac{67.0\%}{78.2\%} = \$126,803$$

The overall IRC section 415(b) limitation is equal to the smaller of the compensation maximum or the dollar maximum. In this case, the dollar maximum of \$126,803 is smaller.

The accrued benefit is equal to the smaller of the plan accrued benefit (\$185,000) or the IRC section 415(b) limit (\$126,803). This is \$126,803.

Brown

The plan accrued benefit as of 12/31/2008 is \$185,000. Brown has retired at age 58, and there is a reduction for early retirement of 6% per year prior to age 65. (Note that it applies because Brown has only 9 years of service). The early retirement benefit is:

$$\$185,000 \times [1 - (6\% \times 7 \text{ years})] = \$107,300$$

The accrued benefit must be limited if the IRC section 415 maximum benefit is less than the plan accrued benefit. The IRC section 415(b) compensation limitation is equal to 100% of the high consecutive 3-year average salary (with salary limited to the maximum salary under IRC section 401(a)(17)), reduced for years of service less than 10. Brown has only 9 years of service as of 12/31/2008, so the compensation limitation of IRC section 415(b) is reduced for service less than 10 years. For purposes of the high consecutive 3-year average salary, each salary for 2006 through 2008 must be limited to that year's IRC section 401(a)(17) limit.

$$\begin{aligned} \text{IRC section 415 compensation limit} &= \frac{\$220,000 + \$225,000 + \$230,000}{3} \times \frac{9}{10} \\ &= \$202,500 \end{aligned}$$

The IRC section 415 dollar limitation for 2008 is \$185,000. This is reduced for years of plan participation less than 10. Brown entered the plan on the effective date of 1/1/2001, and has only 8 years of plan participation as of 12/31/2008, so the dollar limitation of IRC section 415(b) is reduced to 8/10 of the maximum. In addition, Brown's retirement date is 12/31/2008 (at age 58). The dollar limit is reduced actuarially for retirement prior age 62. The decrease is based upon either the plan actuarial assumptions (the plan tabular early retirement factors since this is an early retirement age), or a 5% interest rate and the applicable mortality table (under IRC section 417(e)(3)), whichever provides the smaller result. Since the tabular factors are to be used to reduce benefits from age 65 for early retirement, the dollar maximum must be increased using these values to age 65, and then reduced from age 65 to age 58. This adjusted dollar maximum using the tabular plan early retirement factor of 6% is:

$$\$185,000 \times \frac{8}{10} \div [1 - (6\% \times 3 \text{ years})] \times [1 - (6\% \times 7 \text{ years})] = \$104,683$$

The adjusted dollar limit using 5% interest and the applicable mortality table is:

$$\$185,000 \times \frac{8}{10} \times \frac{57.8\%}{78.2\%} = \$109,391$$

The dollar maximum is \$104,683 (the smaller of \$104,683 and \$109,391). The overall IRC section 415(b) limitation is equal to the smaller of the compensation maximum or the dollar maximum. In this case, the dollar maximum of \$104,683 is smaller.

The accrued benefit is equal to the smaller of the plan accrued benefit (\$107,300) or the IRC section 415(b) limit (\$104,683). This is \$104,683.

Total annual accrued benefit for Smith and Brown = \$126,803 + \$104,683 = \$231,486

Answer is C.

### **Question 33**

Smith is a 1% owner (owns more than 1%) and earned more than \$150,000 in 2008. IRC section 416(i)(1)(A)(iii) and IRS regulation 1.416-1, Q&A T-12 state that an employee who is a 1% owner at any time during the year and earns more than \$150,000 for the year is considered a key employee for the following year. The statement is true.

Answer is A.

### **Question 34**

The experience gain or loss resulting from the retirement of a participant is equal to the difference between the actual liability on account of the actual retirement and the expected accrued liability under the actuarial cost method.

The accrued liability under the unit credit funding method is equal to the present value of the accrued benefit. The expected liability is equal to the present value of the 1/1/2008 accrued benefit (including the expected 2008 accrual) as of 1/1/2009.

$1/1/2008 \text{ accrued benefit} = 1\% \times \$50,000 \times 7 \text{ years of service} = \$3,500$

The accrued benefit is reduced for early retirement by 5% for each year that retirement precedes age 65. There is a 25% probability of retirement at age 62 that is assumed for funding purposes. Since retirement is assumed to occur at the beginning of the year, there would be no 2008 accrual if Smith retired at age 62, and the early retirement benefit would be based only upon the 1/1/2008 accrued benefit. The accrued benefit payable at early retirement age 62 is:

$$\text{Early retirement benefit} = \$3,500 \times [1 - (.05 \times 3 \text{ years})] = \$2,975$$

Note that the assumed probability of retiring at age 65 is 75%. The expected accrued benefit through 2008 if Smith continued working until age 65 (including the expected 2008 accrual and the assumed 4.5% salary increases to retirement) is:

$$1\% \times \$50,000 \times 1.045^3 \times 8 \text{ years of service} = \$4,565$$

As of 1/1/2008, Smith has attained the possible early retirement age of 62 and is 3 years before the normal retirement age of 65. The accrued liability as of 1/1/2008 (including the expected increase in the accrued benefit for 2008) is:

$$\begin{aligned} \text{Accrued liability}_{1/1/2008} &= (\$2,975 \times \ddot{a}_{62}^{(12)} \times .25) + (\$4,565 \times \ddot{a}_{65}^{(12)} \times v^3 \times .75) \\ &= (\$2,975 \times 9.94 \times .25) + (\$4,565 \times 9.24 \times 0.816298 \times .75) \\ &= \$7,393 + \$25,824 = \$33,217 \end{aligned}$$

$$\text{Expected accrued liability}_{1/1/2009} = \$33,217 \times 1.07 = \$35,542$$

Next, the actual benefit can be determined.

$$12/31/2008 \text{ accrued benefit} = 1\% \times \$52,500 \times 8 \text{ years of service} = \$4,200$$

This accrued benefit is reduced for early retirement by 5% for each year that retirement precedes age 65. The accrued benefit payable at early retirement age 63 is:

$$\text{Early retirement benefit} = \$4,200 \times [1 - (.05 \times 2 \text{ years})] = \$3,780$$

$$\text{Actual liability}_{1/1/2009} = \$3,780 \times \ddot{a}_{63}^{(12)} = \$3,780 \times 9.72 = \$36,742$$

The actual liability exceeds the expected liability, so there is an experience loss.

$$\text{Loss} = \$36,742 - \$35,542 = \$1,200$$

Answer is C.

### Question 35

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2009 is:

$$\text{Funding shortfall}_{1/1/2009} = \$2,000,000 - (\$1,840,000 - \$20,000) = \$180,000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2009 (the \$2,000,000 funding target exceeds the \$1,840,000 actuarial value of assets). There is a transition rule available for 2009 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 94% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is the case in this question, since it is given that the deficit reduction contribution applied in 2007 (which is a part of the additional funding charge). So, a funding shortfall amortization base must be set up for 2009 in the amount of \$180,000.

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$$\begin{aligned} \text{Minimum}_{1/1/2009} &= \text{Target normal cost} + \text{Amortization of funding shortfall} \\ &= \$250,000 + (\$180,000/5.9852) \\ &= \$280,074 \end{aligned}$$

The funding standard carryover balance is used to reduce the minimum required contribution (general exam condition 31).

$$\text{\$X} = \$280,074 - \$20,000 = \$260,074$$

Answer is D.

### Question 36

The minimum required contribution for 2008 as of 1/1/2008 is equal to the sum of the target normal cost and the shortfall amortization installment.

$$\text{Minimum required contribution}_{1/1/2008} = \$160,000 + \$20,000 = \$180,000$$

There was no contribution made for 2008, but the funding standard carryover balance as of 1/1/2008 was \$240,000. This is assumed to be applied to the minimum required contribution in order to avoid a funding deficiency (see general exam condition 31). The remaining funding standard carryover balance as of 1/1/2008 is \$60,000 (\$240,000 - \$180,000). This is increased at the 2008 asset rate of return (15%) to the next valuation date of 1/1/2009.

$$\text{Funding standard carryover balance}_{1/1/2009} = \$60,000 \times 1.15 = \$69,000$$

The funding shortfall for 2009 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance). Note that there is no pre-funding balance.

The funding shortfall as of 1/1/2009 is:

$$\text{Funding shortfall}_{1/1/2009} = \$2,100,000 - (\$2,000,000 - \$69,000) = \$169,000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2009 (the \$2,100,000 funding target exceeds the \$2,000,000 actuarial value of assets). There is a transition rule for 2009 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 94% of the funding target for purposes of the exemption. However, this transition rule is not available if a shortfall amortization base was created in 2008, so the transition rule does not apply, and there is a new shortfall amortization base in 2009.

Any new shortfall amortization base is equal to the difference between the current funding shortfall and the outstanding balance of any existing shortfall amortization bases from prior years (see IRC section 430(c)(3)). Since shortfall amortization bases are amortized over 7 years (see IRC section 430(c)(2)(B)), there are 6 years left to amortize the 1/1/2008 shortfall amortization base.

The outstanding balance of the 1/1/2008 shortfall amortization base must be determined using the segmented interest rates used for the 2009 valuation (see IRC section 430(h)(2)(C)). In this case, the amortization factors are based upon the same rates for both 2008 and 2009.

Outstanding balance of 1/1/2008 shortfall amortization base on 1/1/2009

$$= \$20,000 \times 5.2798 = \$105,596$$

New shortfall base as of 1/1/2009 =  $\$169,000 - \$105,596 = \$63,404$

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$$\begin{aligned} \text{Minimum}_{1/1/2009} &= \text{Target normal cost} + \text{Amortization of funding shortfall} \\ &= \$183,000 + \$20,000 + (\$63,404/5.9928) \\ &= \$213,580 \end{aligned}$$

The funding standard carryover balance is used to reduce the minimum required contribution, in order to obtain the smallest amount that satisfies the minimum funding standard.

$$\$X = \$213,580 - \$69,000 = \$144,580$$

Answer is B.

### Question 37

Under IRC section 430(c)(4), the funding shortfall is equal to the excess (if any) of the funding target over the actuarial value of the plan assets (reduced by any credit balances). The only credit balance that could exist as of 1/1/2008 is a funding standard carryover balance equal to the credit balance remaining from the 12/31/2007 funding standard account, and this is zero. Using the information provided in the question,

$$\text{Funding shortfall}_{1/1/2008} = \$1,700,000 - \$1,520,000 = \$180,000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2008 (the \$1,700,000 funding target exceeds the \$1,520,000 actuarial value of assets). However, there is a transition rule available for 2008 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 92% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). The additional funding charge under IRC section 412(l) is assumed not to apply in 2007 (see general exam condition 36). So, the transition rule is available. However, the shortfall base must still be created since 92% of the funding target (\$1,564,000) exceeds the actuarial value of assets (\$1,520,000).

The amortization installment for the 2008 funding shortfall base (amortized over 7 years) is:

$$\text{Amortization of 2008 funding shortfall} = \$180,000/5.9928 = \$30,036$$

The outstanding balance as of 1/1/2009 of the 2008 funding shortfall base is equal to the amortization installment multiplied by a 6-year amortization factor (using the 2009 segmented interest rates).

$$\text{Outstanding balance of 2008 funding shortfall base}_{1/1/2009} = \$30,036 \times 5.2798 = \$158,584$$

Since the net shortfall amortization charge for 2009 is \$40,000, and the amortization charge for the 2008 funding shortfall is still \$30,036 (it is not re-amortized each year, even if the segmented interest rates change), the amortization charge for the 2009 shortfall amortization base must be \$9,964 (\$40,000 - \$30,036). Since the 2009 shortfall amortization base is amortized over 7 years, the amount of the base must be \$59,712 (\$9,964 × 5.9928).

The funding shortfall as of 1/1/2009 is equal to the sum of the outstanding balance of the prior year shortfall amortization bases plus the amount of the 2009 shortfall amortization base (IRC section 430(c)(3)).

Recalling that the funding shortfall is equal to the excess (if any) of the funding target over the actuarial value of the plan assets (reduced by the funding standard carryover balance – which is zero – and the prefunding balance – which is unknown at this point),

$$\begin{aligned}\text{Funding shortfall}_{1/1/2009} &= \$2,000,000 - (\$1,800,000 - \text{Prefunding balance}_{1/1/2009}) \\ &= \$158,584 + \$59,712 \\ &= \$218,296\end{aligned}$$

$$\text{Prefunding balance}_{1/1/2009} = \$18,296$$

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$$\begin{aligned}\text{Minimum}_{1/1/2009} &= \text{Target normal cost} + \text{Amortization of shortfall bases} \\ &= \$100,000 + \$40,000 \\ &= \$140,000\end{aligned}$$

The prefunding balance is used to reduce the minimum required contribution (see general exam condition 35), in order to obtain the smallest amount that satisfies the minimum funding standard. Since the contribution is contributed on 12/31/2009, the minimum required contribution offset by the prefunding balance must be increased with interest at the plan effective rate of 6%.

$$\text{\$X} = (\$140,000 - \$18,296) \times 1.06 = \$129,006$$

Answer is C.

### Question 38

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. Since the plan is not at-risk, the funding target (\$300,000) and target normal cost (\$24,000) without regard to the at-risk assumptions are used.

The cushion amount is:

$$\text{Cushion amount} = (50\% \times \$300,000) + \$60,000 = \$210,000$$

The IRC section 404(o)(2)(A) deductible limit is:

$$\$24,000 + \$300,000 + \$210,000 - \$275,000 = \$259,000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets. These are the target normal cost and funding target using at-risk assumptions.

The IRC section 404(o)(2)(B) deductible limit is:

$$\$30,000 + \$450,000 - \$275,000 = \$205,000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is \$259,000.

Answer is B.

One final note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the last day of the plan year. Without regulations, it is not clear whether the \$259,000 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if \$259,000 is given interest at the plan effective rate of 5.8% to the end of the year, the answer still falls within the same answer range.

### Question 39

The funding target is equal to the present value of the 1/1/2009 accrued benefit.

$$1/1/2009 \text{ accrued benefit} = \$1,750 \times 15 \text{ years of service} = \$26,250$$

This accrued benefit is not reduced for early retirement under the terms of the plan.

In determining the present value, the segment interest rates must be used. Smith is 45 as of 1/1/2009. The third segment interest rate is applicable for all payments made beginning with the 21<sup>st</sup> year after the valuation date (which is the year that Smith turns 65). If Smith retires at age 55 (for which there is an assumed 50% probability), then the second segment interest rate is used to value the payments for the first 10 years, and the third segment interest rate is applicable for all additional benefit payments (beginning at age 65).

Note that the assumed probability of retiring at age 55 is 50% and at 65 is also 50%.

$$\begin{aligned} \text{Funding target}_{1/1/2009} &= (26,250 \\ &\times [(\frac{N_{55@5.75\%}^{(12)} - N_{65@5.75\%}^{(12)}}{D_{55@5.75\%}} \times v_{.0575}^{10}) + (\frac{N_{65@6.35\%}^{(12)}}{D_{55@6.35\%}} \times v_{.0635}^{10})] \times .5) \\ &+ (26,250 \times \frac{N_{65@6.35\%}^{(12)}}{D_{65@6.35\%}} \times v_{.0635}^{20} \times .5) \\ &= 96,904 + 41,630 = 138,534 \end{aligned}$$

Answer is B.

## Question 40

The funding target is equal to the present value of the 1/1/2009 accrued benefit.

$$1/1/2009 \text{ accrued annual benefit} = \$100 \times 12 \times 10 \text{ years of service} = \$12,000$$

This accrued benefit is not reduced for early retirement at age 62 since the participant will have 20 years of service. However, if the participant retires at age 60 (25% assumed probability), then the accrued benefit must be reduced by 7% per year prior to age 65, for a total reduction of 35% ( $7\% \times 5$  years).

$$\text{Reduced accrued benefit at age 60} = \$12,000 \times .65 = \$7,800$$

In determining the present value, the segment interest rates must be used. Smith is 40 as of 1/1/2009. Since the earliest assumed retirement age is 60, all payments will be made more than 20 years after the valuation date. The third segment interest rate (6%) is applicable for all payments made beginning with the 21<sup>st</sup> year after the valuation date, so only the third segment interest rate is applicable for all benefit payments.

Note that the assumed probability of retiring at age 60 is 25% and at 62 is 75%.

$$\begin{aligned} \text{Funding target}_{1/1/2009} &= (7,800 \times \frac{N_{60@6\%}^{(12)}}{D_{60@6\%}} \times v_{6\%}^{20} \times .25) \\ &\quad + (12,000 \times \frac{N_{62@6\%}^{(12)}}{D_{62@6\%}} \times v_{6\%}^{22} \times .75) \\ &= 8,178 + 32,105 = 40,283 \end{aligned}$$

Answer is B.

## Question 41

Under IRC section 430(c)(4), the funding shortfall is equal to the excess (if any) of the funding target over the actuarial value of the plan assets (reduced by the funding standard carryover balance and the prefunding balance). Using the information provided in the question,

$$\text{Funding shortfall}_{1/1/2008} = \$848,000 - (\$736,000 - \$45,600) = \$157,600$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2008 (the \$848,000 funding target exceeds the \$736,000 actuarial value of assets). However, there is a transition rule available for 2008 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 92% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). The additional funding charge under IRC section 412(l) is assumed not to apply in 2007 (see general exam condition 36). So, the transition rule is available. However, the shortfall base must still be created since 92% of the funding target (\$780,160) exceeds the actuarial value of assets (\$736,000).

The amortization installment for the 2008 funding shortfall base (amortized over 7 years) is:

$$\text{Amortization of 2008 funding shortfall} = \$157,600/5.9682 = \$26,407$$

The outstanding balance as of 1/1/2009 of the 2008 funding shortfall base is equal to the amortization installment multiplied by a 6-year amortization factor (using the 2009 segmented interest rates).

$$\text{Outstanding balance of 2008 funding shortfall base}_{1/1/2009} = \$26,407 \times 5.2532 = \$138,721$$

The funding shortfall as of 1/1/2009 is equal to the sum of the outstanding balance of the prior year shortfall amortization bases plus the amount of the 2009 shortfall amortization base (IRC section 430(c)(3)).

Recalling that the funding shortfall is equal to the excess (if any) of the funding target over the actuarial value of the plan assets (reduced by the funding standard carryover balance and the prefunding balance),

$$\text{Funding shortfall}_{1/1/2009} = \$1,200,000 - \$918,400 = \$281,600$$

The funding shortfall amortization base for 2009 is equal to the 2009 funding shortfall less the outstanding balance of the prior year shortfall amortization bases (IRC section 430(c)(3)).

$$2009 \text{ shortfall amortization base} = \$281,600 - \$138,721 = \$142,879$$

The new shortfall amortization installment (amortized over 7 years), attributable to the 2009 shortfall amortization base is:

$$\$142,879/5.9682 = \$23,940$$

Answer is A.

## Question 42

Plans that have been at-risk for at least 2 of the past 4 years are subject to a load on the funding target (IRC section 430(i)(1)(A)(ii)). The load is equal to \$700 times the number of participants in the plan, plus 4% of the funding target determined without the additional at-risk assumptions (IRC section 430(i)(1)(C)). The plan has been at-risk since 2008, so it is subject to the load in 2010. The load on the funding target is:

$$(\$700 \times 600) + (4\% \times \$8,325,000) = \$753,000$$

The funding target using the at-risk assumptions, including the load, is:

$$\$10,250,000 + \$753,000 = \$11,003,000$$

Plans that have been at-risk for fewer than 5 consecutive years are subject to a transition that allows a phase-in between the funding target determined using the at-risk assumptions and loading, and the funding target determined as if the plan is not at-risk (IRC section 430(i)(5)). 2010 is the third consecutive year that the plan has been at-risk. The transition is applied such that the at-risk funding target is equal to 40% of the funding target determined as if the plan is not at-risk, plus 60% of the funding target determined using the at-risk assumptions and load.

$$\text{At-risk funding target} = (40\% \times \$8,325,000) + (60\% \times \$11,003,000) = \$9,931,800$$

Answer is C.

Note: The wording in this question can be a little confusing when compared to general exam condition 48 which says that at-risk funding target includes the load. Since this question specifically indicates that the load is not included, that overrides the general condition.

### Question 43

The minimum required contribution for 2008 as of 1/1/2008 is equal to the sum of the target normal cost and the shortfall amortization installment.

The initial shortfall amortization base is determined based upon the funding shortfall as of 1/1/2008. The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance). Note that there is no pre-funding balance as of 1/1/2008, but there is a funding standard carryover balance of \$180,000.

$$\text{Funding shortfall}_{1/1/2008} = \$1,500,000 - (\$1,519,600 - \$180,000) = \$160,400$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by only the prefunding balance to the extent it is used to reduce the current year's minimum required contribution, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is the case as of 1/1/2008 (the \$1,500,000 funding target is less than the \$1,519,600 actuarial value of assets). Therefore, the plan is exempt from creating a shortfall amortization base for 2008. The minimum required contribution is equal to the target normal cost.

$$\text{Minimum required contribution}_{1/1/2008} = \$120,000$$

Note that there is an option under IRC section 430(a)(2) to determine the minimum (if smaller) by subtracting from the target normal cost the excess of the actuarial value of the assets (reduced by the funding standard carryover balance and the prefunding balance) over the funding target. However, as of 1/1/2008, there is no such excess, so this option will not apply.

There was no contribution made for 2008, but the funding standard carryover balance as of 1/1/2008 was \$180,000. This is assumed to be applied to the minimum required contribution in order to avoid a funding deficiency (see general exam condition 31). The remaining funding standard carryover balance as of 1/1/2008 is \$60,000 (\$180,000 - \$120,000). This is increased at the 2008 asset rate of return (2%) to the next valuation date of 1/1/2009.

$$\text{Funding standard carryover balance}_{1/1/2009} = \$60,000 \times 1.02 = \$61,200$$

The funding shortfall for 2009 is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance). Note that there is no pre-funding balance. The 2009 funding target must be adjusted to reflect the plan amendment.

$$\text{Funding target}_{1/1/2009} = \$1,600,000 \times (\$27/\$25) = \$1,728,000$$

The funding shortfall as of 1/1/2009 is:

$$\text{Funding shortfall}_{1/1/2009} = \$1,728,000 - (\$1,550,000 - \$61,200) = \$239,200$$

The exemption from creating a new shortfall amortization base under IRC section 430(c)(5) does not apply for 2009 since, as of 1/1/2009, the \$1,728,000 funding target exceeds the \$1,550,000 actuarial value of assets. There is a transition rule for 2009 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 94% of the funding target for purposes of the exemption. However, even 94% of the funding target ( $94\% \times \$1,728,000 = \$1,624,320$ ) exceeds the actuarial value of the assets.

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization base (7-year amortization). The target normal cost must be adjusted to reflect the plan amendment.

$$\text{Target normal cost}_{1/1/2009} = \$145,000 \times (\$27/\$25) = \$156,600$$

$$\begin{aligned} \text{Minimum}_{1/1/2009} &= \text{Target normal cost} + \text{Amortization of funding shortfall} \\ &= \$156,600 + (\$239,200/5.9682) \\ &= \$196,679 \end{aligned}$$

The funding standard carryover balance is used to reduce the minimum required contribution, in order to obtain the smallest amount that satisfies the minimum funding standard.

$$\text{\$X} = \$196,679 - \$61,200 = \$135,479$$

Answer is C.

## Question 44

The accrued benefit for Smith must be limited if the IRC section 415 maximum benefit is less than the plan accrued benefit. The IRC section 415(b) compensation limitation is equal to 100% of the high consecutive 3-year average salary, reduced for years of service less than 10. Smith has only 8 years of service as of 12/31/2008, so the compensation limitation of IRC section 415(b) is reduced to 8/10 of the maximum. In Smith's case, where the high consecutive 3-year average salary is less than \$10,000 per year, the high 3-year average can sometimes be increased to \$10,000 (before application of the 8/10 reduction factor) under IRC section 415(b)(4). Note that this provision is not available to participants who have ever participated in a defined contribution plan sponsored by the same employer. Smith has a profit sharing plan account balance, so is not eligible for the \$10,000 de minimis IRC section 415 compensation limit.

$$\text{IRC section 415 compensation limit} = \$8,700 \times \frac{8}{10} = \$6,960$$

The IRC section 415 dollar limitation for 2008 is \$185,000. This is reduced for years of plan participation less than 10. Smith entered the plan on 1/1/2004, and has only 5 years of plan participation as of 12/31/2008, so the dollar limitation of IRC section 415(b) is reduced to 5/10 of the maximum. This is:

$$\text{IRC section 415 dollar limit} = \$185,000 \times \frac{5}{10} = \$92,500$$

The dollar limit is also increased due to Smith's retirement after age 65 (at age 68). However, there is no need to bother with this calculation because the compensation limit is clearly much smaller than the dollar limit.

The overall IRC section 415(b) limitation is equal to the smaller of the compensation maximum or the dollar maximum. In this case, the compensation maximum of \$6,960 is smaller.

The maximum monthly benefit payable to Smith is \$580 (\$6,960/12).

Answer is C.

## Question 45

The accrued liability under the unit credit method is determined as the present value of the accrued benefit, using the plan's funding assumptions (assumed retirement age 65). There is an experience gain if the accrued liability exceeds the actual liability (the present value of the actual early retirement benefit).

### Smith

Smith retires at age 56. The early retirement reduction factor is:

$$1 - (8\% \times 5 \text{ years}) - (3\% \times 4 \text{ years}) = 0.48$$

$$\text{Accrued liability} = \$120 \times 12 \ddot{a}_{65}^{(12)} \times v^9 = \$1,440 \times 11.75 \times 0.543934 = \$9,203$$

$$\begin{aligned} \text{Present value of early retirement benefit} &= \$120 \times 0.48 \times 12 \ddot{a}_{56}^{(12)} \\ &= \$6,912 \times 14.00 = \$9,677 \end{aligned}$$

There is a loss since the actual liability exceeds the expected (accrued) liability.

### Jones

Jones retires at age 64. The early retirement reduction factor is:

$$1 - (8\% \times 1 \text{ year}) = 0.92$$

$$\text{Accrued liability} = \$550 \times 12 \ddot{a}_{65}^{(12)} \times v = \$6,600 \times 11.75 \times 0.934579 = \$72,477$$

$$\begin{aligned} \text{Present value of early retirement benefit} &= \$550 \times 0.92 \times 12 \ddot{a}_{64}^{(12)} \\ &= \$6,072 \times 12.00 = \$72,864 \end{aligned}$$

There is a loss since the actual liability exceeds the expected (accrued) liability.

### Brown

Brown retires at age 60. The early retirement reduction factor is:

$$1 - (8\% \times 5 \text{ years}) = 0.60$$

$$\text{Accrued liability} = \$300 \times 12 \ddot{a}_{65}^{(12)} \times v^5 = \$3,600 \times 11.75 \times 0.712986 = \$30,159$$

$$\begin{aligned} \text{Present value of early retirement benefit} &= \$300 \times 0.60 \times 12 \ddot{a}_{60}^{(12)} \\ &= \$2,160 \times 13.00 = \$28,080 \end{aligned}$$

There is a gain since the actual liability is less than the expected (accrued) liability.

Answer is C.

### Question 46

Under the entry age normal method, the normal cost is determined by first calculating the present value of future benefits at entry age (age at hire), and then amortizing that over the future years for the participant through retirement age. Since there are assumed retirement rates (the probability of retirement at age 60 is 50%, and at age 65 is 50%), the projected retirement benefit must be determined for each possible retirement age.

Age 60: There is a reduction of 5% per year prior to age 65 upon early retirement. Therefore, the projected benefit must be reduced by 25% ( $5\% \times 5$  years) at age 60. Note that total years of service through age 60 for Smith will be 20 years.

Age 60 projected annual benefit =  $\$200 \times 12 \times 20 \text{ years} \times .75 = \$36,000$

PVFB at age 40 of projected annual benefit =  $\$36,000 \times \frac{N_{60}^{(12)}}{D_{40}} = \$129,612$

Age 65: Projected annual benefit =  $\$200 \times 12 \times 25 \text{ years} = \$60,000$

PVFB at age 40 of projected annual benefit =  $\$60,000 \times \frac{N_{65}^{(12)}}{D_{40}} = \$139,510$

The total PVFB is equal to the individual PVFB at each retirement age, multiplied by the probability of retirement at that age.

Total PVFB =  $(\$129,612 \times 50\%) + (\$139,510 \times 50\%) = \$134,561$

The present value of future benefits is amortized over the future working lifetime of Smith in order to determine the normal cost. Since Smith may retire at age 60 or age 65, the future working lifetime is weighted by the probability of retirement at each age.

$$\text{Normal cost} = \frac{\$134,561}{\left[ \left( \frac{N_{40} - N_{60}}{D_{40}} \right) \times 50\% \right] + \left[ \left( \frac{N_{40} - N_{65}}{D_{40}} \right) \times 50\% \right]} = \$10,608$$

Answer is C.



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