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EA-2F Exam

Course Outline, Problems & Solutions

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ABOUT THIS MANUAL

This manual consists of my course outline and practice questions that have been inserted into the various sections of the outline. It reflects the course syllabus as published in January of 2023. Since this manual is being published before the final syllabus is published in the July, 2023 Joint Board program document (likely available in August or early September, 2023), those updates are not reflected in this outline. It is possible that there will be a few additions and/or deletions to the reading for this exam once that program document is released. It is advisable to check the ASM website (www.studymanuals.com) for additions, changes and errata to this manual soon after that program document is published.

This manual is intended as a supplement to the suggested readings listed in the exam syllabus (not as the sole study material). It is possible that there could be exam questions that are not covered by the contents of this manual.

In addition to this manual, there are two other sources of material that I would suggest using in preparation for the EA-2F exam. First, there is an SOA study note dealing with this topic that can be downloaded from the SOA web site ("Assessment and Selection of Actuarial Assumptions for Measuring Pension Obligations"). The link can be found in the Joint Board program document. There are typically one or two exam questions for which this is the source material.

Second, the best text that is worth using for understanding actuarial cost methods is an out of print text, Actuarial Cost Methods, A Review, by Farrimond/Mayer. This text provides solutions to old EA-1B exams from 1984 – 1997, plus a few original questions. It is organized by cost method, allowing a lot of practice on each method. (Although the text is currently out of print, it is available for free download at www.asppa.org/news-resources/researchwhite-papers/actuarial-cost-methods-review-3rd-edition-1999.) Nearly all problems contained in the Farrimond/Mayer text are still valid questions. Based upon the past exams, the unit credit method is the cost method that is most likely to be tested, so it is important to know that method, at the very least. However, it is likely that there will be 2 to 4 questions that test other methods (there have been more than that number on a couple of exams). Entry age normal, frozen initial liability, and aggregate are the most likely of the other methods to be tested. The attained age normal has been tested only once, and the individual aggregate and individual level premium methods have not been tested since prior to the 2007 exam.

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Guide for using EA-2F Outline

Some of the syllabus items for the EA-2F exam are rarely tested. This guide can be used to help you focus on what are typically the most important parts of the outline.

Pages 1 – 188: Single employer minimum funding is the most heavily tested topic on the exam, typically about 50% of the points. These would be the most important pages in the outline.

Pages 189 – 247: Funding based limits (IRC section 436) is typically tested in about 2 – 4 exam questions.

Pages 248 – 258: Multiemployer plan minimum funding is typically tested in about 4 – 6 exam questions (but quite a few more than normal on the 2015 exam).

Pages 259 – 318: Actuarial cost methods are typically tested in about 4 – 6 questions (but a few more than normal on the 2015 exam), and are also used in the multiemployer plan minimum funding questions. The cost methods most likely to be tested are Aggregate, Frozen initial liability, Unit credit, and Entry age normal. The other cost methods have not been tested since before the 2007 exam, with the exception of Attained age normal, which was tested once, in 2015. For more practice problems dealing with the cost methods (which I highly recommend), a copy of the text "Actuarial Cost Methods, A Review" can be downloaded from the ASPPA web site (https://www.asppa.org/news-resources/researchwhite-papers/actuarial-cost-methods-review-3rd-edition-1999).

Pages 319 – 342: The full funding limit is not tested on every exam, but is tested on many exams.

Pages 343 – 353: The funding rules for multiemployer plans in critical or endangered status are typically tested in 1 – 3 mostly true/false exam questions.

Pages 354 – 361: The deduction rules for single employer plans are typically tested in about 1 – 3 exam questions.

Pages 362 – 371: The deduction rules for multiemployer plans are not tested on most exams, but are tested occasionally.

Pages 372 – 387: The special deduction rules, combined deduction rules, and sole proprietor rules have generally not been tested since before the 2007 exam.

Pages 388 – 394: The excise tax rules for nondeductible contributions have not been tested in much detail since before the 2007 exam.

Pages 395 – 416: The rules for maintaining amortization bases for multiemployer plans have not been tested since before the 2007 exam (other than the rules dealing with minimum funding at the top of page 414 and questions 142 and 143).

Pages 417 – 433: The rules regarding changes in cost methods for single employer plans are tested in 1 – 3 exam questions. The rules regarding changes in cost methods (for multiemployer plans) are rarely tested.

Pages 420 – 433: These rules are tested occasionally.

Pages 434 – 442: The rules regarding the shortfall funding method, which only applies to multiemployer plans, have not been tested since before the 2007 exam

Pages 443 – 447: The compensation limits of IRC section 401(a)(17) are typically tested directly in 1 – 3 exam questions.

Pages 448 – 465: The IRC section 415 limits and 416 top heavy benefits are primarily tested on the EA-2L exam. However, they can be tested as part of a funding question, and might be expected to be tested in 1 or 2 exam questions.

Pages 466 – 474: The lump sum distribution rules are typically tested in 1 – 2 exam funding questions.

Pages 475 – 491: The merger and spinoff rules have generally not been tested since before the 2007 exam.

Pages 492 – 514: The funding rules with regard to gains and losses and retirement rate assumptions are typically tested in a few exam questions.

Pages 515 – 525: The rules regarding end of year valuations, life insurance, and employee contributions for multiemployer plans have generally not been tested since before the 2007 exam. There have been a couple of employee contribution questions since 2007.

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Minimum Funding Standards for Single Employer (or Multiple Employer) Plans (IRC section 430)

- Minimum required contribution for plan years beginning after 12/31/2007
  - The minimum required contribution is generally equal to the sum of:
    - The target normal cost for the year
    - The shortfall amortization charge for the year
    - The waiver amortization charge for the year
  - If the value of the plan assets is at least as large as the funding target for the year, then the minimum required contribution is equal to the target normal cost, reduced by the excess of the value of the plan assets over the funding target. In no event can the minimum required contribution be less than $0.
  - The value of the plan assets is generally reduced by the prefunding balance and funding standard carryover balance. Note that the general conditions of the exam state that the assets provided in an exam question have not been adjusted by these items, unless you are specifically told otherwise.
- Target normal cost (IRC section 430(b))
  - The **target normal cost** is equal to the difference between the present value of the end of year accrued benefit and the present value of the beginning of year accrued benefit (increased by the expected plan-related expenses for the year, and reduced by the expected mandatory employee contributions for the year). In no event can the target normal cost be less than zero.
  - The beginning of year accrued benefit **does not** take into account any salary increase for the current year.
  - The end of year accrued benefit **does** take into account any salary increase for the current year. You cannot project the current year increase past the end of the current year.
  - Accrued benefits include top heavy minimums under IRC section 416 and are subject to the benefit limits of IRC section 415.
  - Compensation must be limited as required by IRC section 401(a)(17).
  - For a cash balance/hybrid plan, the benefit used for the target normal cost is the current year contribution credit, accumulated to the assumed retirement age using the plan's future interest crediting rate.

- Funding target (IRC section 430(d))
  - The **funding target** is equal to the present value of the beginning of year accrued benefit.
  - The beginning of year accrued benefit **does not** take into account any salary increase for the current year.
  - Accrued benefits include top heavy minimums under IRC section 416 and are subject to the benefit limits of IRC section 415.
  - Compensation must be limited as required by IRC section 401(a)(17).
  - For a cash balance/hybrid plan, the accrued benefit is the account balance, accumulated to the assumed retirement age using the plan's future interest crediting rate. Note that accumulated balances can never be less than the total of the contributions credits to date (preservation of principal).
  - The **funding target attainment percentage** (FTAP) is equal to the ratio of the value of the plan assets to the funding target (without regard to at-risk assumptions).
    - The value of the plan assets are generally reduced by the prefunding balance and funding standard carryover balance.
    - If the funding target is equal to zero, then the FTAP is equal to 100%.
- Allocation of benefits between funding target and target normal cost (Treasury regulation 1.430(d)-1(c)(1)(ii))
  - The benefits are generally allocated between the funding target and target normal cost based upon the actual accrual of benefits, or the crediting of years of service.
  - For benefits that are not earned based on service or accrual, such as a supplemental benefit, the allocation is made pro-rata based upon service to date (for allocation to the funding target) and one year of service (for allocation to the target normal cost) as a percentage of total service at retirement.
    - For example, consider the following. A plan provides a supplemental benefit of a flat dollar amount of $900 per month payable from age 60 through 65, for participants who elect to retire early at age 60. Participant Smith was hired at age 30 and is currently age 50. Smith currently has 20 years of service and will have 30 years of service at age 60. For purposes of the funding target, the supplemental benefit is $600 per month ($20/30^{th}$ of $900). For purposes of the target normal cost, the supplemental benefit is $30 per month ($1/30^{th}$ of $900).

- Effect of plan amendments on target normal cost and funding target
  - A plan amendment deemed to be effective for the current year under IRC section 412(d)(2) is applied for purposes of determining both the target normal cost and the funding target. So, even if the amendment is either adopted or effective after the valuation date, if the plan sponsor has elected to determine the minimum required contribution by taking into account the plan amendment, then it is applied as if it became effective on the first day of the plan year.
  - Exception to plan amendment rules: If the plan amendment becomes effective or is adopted after the first day of the year, and the amendment increases benefits with regard to future service only (so that it would impact only the target normal cost and not the funding target), it **must** be taken into account if it would cause the restrictions on plan amendments under IRC section 436(c) to apply if the increase were included in the plan's funding target (that is, the AFTAP would fall below 80% if the increase is included as part of the funding target). This is necessary to prevent a situation where a plan amendment becomes effective or is adopted after the valuation date for the sole purpose of avoiding the plan amendment requirements of IRC section 436(c).
    - Example: A plan is amended effective 1/1/2014 (adopted on 5/1/2014) to increase the accrual rate beginning in 2014 from \$50 to \$55 (past service accruals remain at \$50). As of 1/1/2014, the target normal cost based on the \$50 accrual is \$30,000, the funding target based on the \$50 accrual is \$280,000, the actuarial value of assets is \$230,000, and the prefunding balance is \$5,000. The increase in the target normal cost due to the amendment is \$3,000 (the 2014 accrual increases by 10% from \$50 to \$55). The AFTAP is 80.36% ($\frac{\$230,000 - \$5,000}{\$280,000}$). If the \$3,000 increase in the target normal cost is included in the denominator, the percentage is 79.51% ($\frac{\$230,000 - \$5,000}{\$280,000 + \$3,000}$). Generally, the plan sponsor would have the option of taking the plan amendment into account for the 1/1/2014 valuation because it was adopted after the valuation date. However, in this case the plan amendment must be taken into account because if the increase in the target normal cost due to the amendment were included in the denominator of the AFTAP, it would be less than 80%. Note that the actual AFTAP does not change – it is still 80.36%.

- Coordination with IRC section 436 restrictions
  - Benefits not paid or accrued as of the valuation date due to restrictions under IRC section 436 must generally not be included in the determination of the target normal cost and funding target.
  - The determination of the target normal cost and funding target cannot take into account any assumption with regard to any possible future restriction after the valuation date due to IRC section 436.
- Plan population
  - For purposes of determining the target normal cost and funding target, the plan population included in the valuation must include participants currently employed by the employer, participants who are retired or no longer employed by the employer, and any other individuals (such as beneficiaries of deceased participants) entitled to benefits under the plan.
  - Terminated nonvested participants can be disregarded once they have at least 5 consecutive years of breaks in service. However, if the plan's experience with regard to nonvested terminated participants has been that they have generally not returned to service, then those nonvested terminated participants can be excluded from the valuation sooner than the 5 years.
  - Current employees not yet eligible to participate in the plan can be included in the valuation, in anticipation of their eventual entry into the plan.
- Funding shortfall (IRC section 430(c))
  - The **funding shortfall** is equal to the difference between the funding target and the value of the plan assets (reduced by the prefunding balance and funding standard carryover balance). The funding shortfall cannot be less than $0. Note that the funding target for the funding shortfall is based upon the funding target after applying the at-risk assumptions and any phase-in, if applicable.

- Shortfall amortization base
  - The **shortfall amortization base** is equal to the difference between the funding shortfall and the outstanding balance of the prior shortfall and waiver amortization bases. This can result in a new negative base.
  - If the funding shortfall for the current year is $0, then
    - There is no new funding shortfall amortization base for the year, and
    - The prior funding shortfall amortization bases are deemed to be fully amortized.
  - The shortfall amortization installment is an amortization of the shortfall amortization base over a period of 15 years using the segmented interest rates under IRC section 430(h)(2)(C). Since it is amortized over 15 years, the segment 1 interest rate is used to discount the first 5 payments, and the segment 2 interest rate is used to discount the last ten payments. The amortization installment remains the same for each of the 15 years. There is no re-amortization for changes in interest rates. After 15 years, the shortfall amortization base is fully amortized.
  - Prior to 2022, the amortization period of the shortfall amortization bases was 7 years. Beginning in 2022, the prior amortization bases are deemed to be fully amortized, and a new 15 year amortization base is created equal to the 2022 funding shortfall. The employer can elect to apply the new 15 year amortization rule before 2022, in 2019, 2020, or 2021. If that election is made, then the reset to 15 year amortization bases is made at that time (meaning that the prior 7 year bases are deemed to be fully amortized, and a new 15 year amortization base is established). Note that, under the exam general conditions, it is assumed that the employer has <u>not</u> elected to establish the new 15 year amortization base prior to 2022.
  - The shortfall amortization charge is equal to the sum of the shortfall amortization installments with regard to the current year shortfall amortization base and each of the shortfall amortization bases established for any prior years. The shortfall amortization charge (net amount of the installments) cannot be less than zero, although individual installments can be less than zero when there are negative bases.
  - A shortfall amortization installment is pro-rated for short plan years. A final pro-rated installment is required in the 16^{th} year in an amount equal to the difference between the full installment and the pro-rated installment (with no interest adjustment). See Treasury regulation 1.430(a)-1(b)(2)(ii).

- If there is a change in the valuation date, the amount of the amortization installment becomes payable on that new valuation date. The amount of the installment is unchanged regardless of the new valuation date. See Treasury regulation 1.430(a)-1(c)(2)(iii).
- The outstanding balance of a shortfall amortization base as of a valuation date is equal to the present value of the remaining payments using the segment interest rates in effect for the valuation date (**not** the original segment rates used to amortize the base).

- Exemption from new shortfall amortization base
  - A plan is exempt from creating a new shortfall amortization base for a plan year if the valuation assets are at least as large as the funding target. For this purpose, the valuation assets are not reduced by the funding standard carryover balance, but are *possibly* reduced by the entire prefunding balance (but only if the employer has elected to use any portion of the prefunding balance for the year to reduce the minimum funding requirement).

- Waiver amortization base
  - A waiver amortization base is created if there is a waived funding deficiency under IRC section 412(c) for a previous plan year. Note that a funding deficiency (and if waived, the amount of the waived funding deficiency) is determined as of the valuation date for the year.
  - The waiver amortization installment is an amortization of the waiver amortization base over a period of 5 years using the segmented interest rates under IRC section 430(h)(2)(C). The amortization installment remains the same for each of the 5 years. There is no re-amortization for changes in interest rates. After 5 years, the waiver amortization base is fully amortized.
  - The waiver amortization charge is equal to the sum of the waiver amortization installments with regard to the current year waiver amortization base and each of the waiver amortization bases established for any of the 4 prior years
  - The interest rate used to amortize a waiver amortization installment is based upon the segmented interest rates that applied to the plan for the year for which the waiver is granted (not the year the waiver is first amortized). See Treasury regulation 1.430(a)-1(d)(1). The amortization installments are determined using the amount of the waived deficiency. As a result, since amortization begins in the following year, the first installment will generally be one year after the waived deficiency arose (on the next valuation date), so the 5 payments will be made 1, 2, 3, 4 and 5 years after the date the deficiency was waived. That 5th payment will involve the second segment interest rate. See example 3 in Treasury regulation 1.430(a)-1(g).
  - The outstanding balance of a waiver amortization base on a valuation date is equal to the present value of the remaining payments using the segment 1 interest rate in effect for the valuation date (**not** the original segmented rates used to amortize the base).
  - A waiver amortization installment is pro-rated for short plan years. A final pro-rated installment is required in the 6th year in an amount equal to the difference between the full installment and the pro-rated installment. See Treasury regulation 1.430(a)-1(b)(2)(ii).
  - The prior waiver amortization bases are deemed to be fully amortized if the funding shortfall is $0.

- Funding standard carryover balance (IRC section 430(f)(7) and Treasury regulation 1.430(f)-1)
  - The funding standard carryover balance only exists for plans effective prior to 2008. There are never additions to the funding standard carryover balance.
  - Any portion of the funding standard carryover balance can be elected by the plan sponsor to be used to reduce the minimum required contribution by subtracting that portion from the minimum as of the first day of the plan year. There is a general exam condition that states that the employer elects to use the funding standard carryover balance in this manner, unless you are told otherwise.
  - The election must be made by the minimum funding due date, and the election is generally irrevocable. However, the election can be revoked if the amount of the revocation represents application of the funding standard carryover balance in excess of the minimum required contribution. So, for example, if the minimum required contribution is equal to $100,000 and the applied funding standard carryover balance used to offset the minimum is $105,000, then $5,000 of the offset can be revoked. The revocation must be in writing to the enrolled actuary and plan administrator no later than the end of the plan year (or the due date of the minimum required contribution for plans with a valuation date other than the first day of the year).
  - A standing election may be made with regard to the use of the funding standard carryover balance such that it would be used to reduce the minimum required contribution to the extent that the plan would otherwise have a funding deficiency. The standing election must be signed by the plan sponsor by the minimum funding due date for the year to which it will apply, and must name the enrolled actuary providing certification to the plan. If the plan enrolled actuary is replaced, then a new standing election must be provided to the new enrolled actuary (otherwise the standing election no longer exists) no later than the due date (with extensions) to the Form 5500. Standing elections are deemed to be effective on the due date of the Form 5500. The standing election can be revoked, as long as that is done prior to the due date of the Form 5500.

- The funding standard carryover balance is not available in a year when the ratio of the value of plan assets (reduced by the prefunding balance) for the prior year to the funding target for the prior year is less than 80% (for this purpose, use the not-at-risk funding target if the plan is at risk). For new plans, the funding ratio is deemed to be 80% in the first year if the funding target is zero. There is a general exam condition that states that the plan was at least 80% funded in the prior year, unless you are told otherwise or given information to be able to determine the prior year funded percentage.
- If the valuation date is not the first day of the plan year, the funding standard carryover balance is increased with interest from the first day of the year to the valuation date using the plan's effective interest rate for the year for purposes of applying it to the current year valuation.
- The unused prior year funding standard carryover balance is increased with interest based upon the prior year rate of return on the plan assets (note that this is not the valuation interest rate). This interest is credited from the valuation date for the current year (the year the funding standard carryover balance is applied to the minimum required contribution) to the beginning of the following year. If the valuation date is not the first day of the year, the unused funding standard carryover balance must first be discounted to the first day of the year using the effective interest rate, and then increased to the first day of the following year using the rate of return on the assets.

- Prefunding balance (IRC section 430(f)(6) and Treasury regulation 1.430(f)-1)
  - New plans have no prefunding balance.
  - The increase in the prefunding balance each year is equal to the excess of the contributions for the preceding year over the minimum required contribution (generally without reduction for any credit balance items) for the preceding year. The plan sponsor must make an election to apply (add) those excess contributions to the prefunding balance. The contribution, if elected, that is added to the prefunding balance is equal to the contribution determined as of the current year valuation date, increased using the current year plan effective rate to the beginning of the following year. There is a general exam condition that states that the employer elects to credit the excess contributions in this manner, unless you are told otherwise.
    - If the employer has elected to use a portion of the funding standard carryover balance and/or the prefunding balance to reduce the minimum required contribution, then the portion of the excess contribution attributable to that reduction amount is increased using the asset rate of return instead of the plan effective rate (see Treasury Regulation 1.430(f)-1(b)(3)(iii)).
  - The election to make an addition to the prefunding balance must be made by the minimum funding due date, and the election is generally irrevocable. However, the election can be revoked under the same conditions as described for the funding standard carryover balance.
  - A standing election may be made with regard to the use of the prefunding balance in the same manner as it can be made for the funding standard carryover balance.
  - Contributions for the preceding year must be adjusted with that year's effective rate of interest from the date contributed (even if contributed after the end of the plan year but within the 8½ month funding period) to the first day of the current year. Contributions are assumed to first be used to meet the minimum funding requirement for the prior year. Contributions deposited to avoid funding-based benefit limitations under IRC section 436 are excluded for this purpose.

- Any portion of the prefunding balance can be elected by the plan sponsor to be used to reduce the minimum required contribution by subtracting that portion from the minimum as of the first day of the plan year. However, the prefunding balance cannot be used if there is also a funding standard carryover balance. The prefunding balance can be used in a year once the funding standard carryover balance is totally used up. There is a general exam condition that states that the employer elects to use the prefunding balance in this manner, unless you are told otherwise.
- The prefunding balance is not available in a year when the ratio of the value of plan assets (reduced by the prefunding balance) for the prior year to the funding target for the prior year is less than 80%. This rule is the same as for the funding standard carryover balance.
- If the valuation date is not the first day of the plan year, the prefunding balance is increased with interest from the first day of the year to the valuation date using the plan's effective interest rate for the year for purposes of applying it to the current year valuation.
- The unused prior year prefunding balance is increased with interest based upon the prior year rate of return on the plan assets (note that this is not the valuation interest rate). This interest is credited from the valuation date for the current year (the year the prefunding balance is applied to the minimum required contribution) to the beginning of the following year. If the valuation date is not the first day of the year, the unused prefunding balance must first be discounted to the first day of the year using the effective interest rate, and then increased to the first day of the following year using the rate of return on the assets.
- An excess contribution can apply towards the prefunding balance in situations where part or all of the funding standard carryover balance and/or the existing prefunding balance are used to reduce the minimum required contribution. In that case, the portion of the excess contribution that was in excess solely on account of the use of the funding balance(s) must be increased to the next valuation date with the asset rate of return.

- Election to reduce funding balances
  - The plan sponsor can elect to reduce the funding standard carryover balance or prefunding balance **prior** to any determination of the value of the plan assets for the plan year. This election could prevent the plan from being considered at-risk, or could prevent the plan from being restricted under IRC section 436.

- Any elected reduction must be made to the funding standard carryover balance first; once the funding standard carryover balance is reduced to $0, then the plan sponsor can elect to reduce the prefunding balance.
- The election to reduce the balances must be made no later than the end of the plan year.
- There is a general exam condition that states that the employer does not elect to reduce the funding standard carryover balance or the prefunding balance unless you are told otherwise.
- Effect of reducing funding standard carryover balance and/or prefunding balance
  - May allow a plan to avoid one or more of the benefit restrictions under IRC section 436
  - May allow the plan to avoid being at-risk in the following year
- Although elections (reduction in balance, use of balance to offset minimum required contribution) are generally deemed to occur chronologically, if an election is made to reduce a funding balance, it is always deemed to occur on the first day of the year, before any other elections apply. It is possible that this can result in a missed quarterly contribution, if the funding balance was used to satisfy that requirement. This can also have an effect on the amount of the funding balances available for the prior plan year. The reduced funding balance as of the beginning of the current year must be discounted using the prior year's asset rate of return to the prior year's valuation date in order to determine the amount of the funding balance available for the prior year.
  - Example: 1/1/2015 prefunding balance = $40,000; 2015 asset rate of return is 4%; on 3/31/2016 the employer elects to reduce the prefunding balance to $15,000; on 9/1/2016 the employer elects to use the prefunding balance to reduce the 2015 minimum required contribution.
    - The 1/1/2016 prefunding balance, prior to any reduction, is $41,600 ($40,000 × 1.04). Effective 3/31/2016, this is reduced to $15,000. On 9/1/2016, the employer elects to apply the 2015 prefunding balance to the 1/1/2015 minimum required contribution. The amount available to reduce the 2015 minimum is $14,423 ($15,000 ÷ 1.04). After application of the $14,423, the prefunding balance is reduced to $0.

- Valuation of assets and liabilities (IRC section 430(g))
  - The valuation date must generally be the first day of the plan year.
  - For plans with 100 or fewer participants (including active and inactive participants) on each day of the prior year, the valuation date may be any day during the plan year.
    - All non-multiemployer defined benefit plans maintained by the same employer (within the controlled group) must be combined for purposes of the participant count.
    - For the first year of a plan, the size of the plan is based upon a reasonable estimate of the number of participants on each day during the first plan year.
  - A change in the valuation date is treated as a change in the funding method. Automatic approval for a change in the valuation date required under IRC section 430 is granted under Treasury regulation 1.430(g)-1(b)(2)(iv) when a small plan using a last day valuation no longer qualifies as a small plan and must change to a first day valuation.
  - The value of plan assets is generally fair market value.
  - There is an option to use an averaging of the fair market value of assets. See IRC section 430(g)(3)(B) and Revenue Notice 2009-22. Note that this method is equivalent to the smoothed value method described in Revenue Procedure 2000-40, provided there are no receivable contributions for a prior year (in which case the results will be close, but off by a small amount attributable to interest on the discounted receivable contribution). See the section titled "Minimum Funding Standards for Multiemployer Plans" later in this outline for a description of this method.
    - The actuarial value is based upon an average of the fair market value on the valuation date and the adjusted fair market values determined for one or more determination dates (on dates prior to the valuation date).
    - The adjusted fair market value for each determination date is equal to the fair market value on the determination date, increased by contributions included in the fair market value on the valuation date that were not included in the fair market value on the determination date, and reduced by benefits and administrative expenses paid by the plan between the determination date and the current valuation date. An adjustment is also made for expected earnings.

- Assets transferred out of the plan with regard to a spin-off are treated as a distribution, and assets transferred into the plan from another plan are treated as contributions.
- The adjustment to the fair market value for a determination date due to the expected earnings is made from the determination date to the valuation date. The expected earnings must be based upon the actuary's best estimate of expected earnings during the period, but in no event can this exceed the third segment interest rate that applies for the year in which the expected earnings are determined.
- Cannot average over a period of more than approximately 2 years (averaging period cannot begin before the last day of the 25th month before the valuation month, and cannot end after the valuation date).
- The time period between the determination dates chosen during the "25-month" period must be in equal increments, and cannot be more than 12 months apart. For example, for determining the average value as of 1/1/2012, asset determination dates of 1/1/2010, 7/1/2010, 1/1/2011 and 7/1/2011 can be chosen since they are all spaced 6 months apart.
- The average value (after adjustments for receivable contributions or excludable contributions, as outlined below) cannot be less than 90% or more than 110% of the fair market value of assets (also adjusted for the receivable and excludable contributions).

o A change in the method of valuing assets is treated as a change in the funding method.

o Contributions receivable for the prior year (contributed on or before the minimum funding due date) must be included in the value of assets.

- If they were deposited after the first day of the current year, they must be discounted with interest using the prior plan year's effective rate of interest for valuation purposes from the date deposited to the current year valuation date.
- There is a general exam condition that states that the receivable contributions are included in the assets, unless you are told otherwise.

- Contributions made for the current year and prior to the valuation date must be excluded from the value of assets.
  - Interest is credited to these contributions using the effective rate of interest for valuation purposes for the current year from the date contributed to the valuation date. This interest is excluded from the value of assets as well as the contribution.
  - Note that contributions made before the first day of the plan year cannot be applied to the current year (they must be designated as contributed for the prior year) and are not excluded from the value of assets.
  - The typical situation where there would be contributions made for the current year and prior to the valuation date would be for an end of year valuation.
  - If the subtraction of these contributions results in an asset value less than zero, then the asset value is deemed to be zero.
- A change in the funding method due to a change in the valuation date or asset valuation method has automatic approval as described in Revenue Procedure 2017-56.

- Actuarial assumptions and methods (IRC section 430(h), Revenue Procedure 2017-57, sections 3.02(c) and (d))
  - The assumptions and methods must each be reasonable, and in combination with each other represent the actuary's best estimate of anticipated experience under the plan.
  - Interest rates
    - The **effective interest rate** is the single rate which would produce the present value of accrued benefits equal to the funding target (without regard to at-risk assumptions). If the funding target for the year is zero, then the target normal cost is used in place of the funding target.
    - **Segment interest rates** are generally used to determine the funding target, target normal cost, and amortize bases.
      - Segment interest rates are based on an average of monthly corporate bond yield curves for the 24-month period ending on the month prior to the date for which the rate is published.
      - The first segment is the 5-year period beginning on the valuation date. The first segment interest rate uses only the portion of the bond yield curve based upon bonds maturing during the 5-year period.
      - The second segment is the next 15-year period (after the 5th year and within 20 years). The second segment interest rate uses only the portion of the bond yield curve based upon bonds maturing during the 15-year period.
      - The third segment is the period after the first 20 years. The third segment interest rate uses only the portion of the bond yield curve based upon bonds maturing within the next 40 years (after the first 20 years).
    - Each segment interest rate is used to calculate the present value of benefits expected to be paid during that segment period.
    - The corporate bond yield curve reflects the average monthly yield on investment grade corporate bonds at the top 3 quality levels during the prior 24 month period.

- The plan sponsor may elect to use the full corporate bond yield curve (without regard to the 24-month averaging) instead of the segmented rates (for minimum required contribution only – the segmented rates must be used for other purposes). Once selected, this election can only be changed with IRS approval. Note that if the plan sponsor has been using the segment rates and subsequently decides to change to the use of the full yield curve in a later year, that change to the full yield curve is deemed to have IRS approval (regulation 1.430(h)(2)-1(e)(1) and Revenue Procedure 2017-57, section 3.02(d), example 1).
- The corporate bond yield curve rates and segment rates are published monthly by the IRS.
- The rate used for a valuation must be either the one published for the valuation month, or any of the 4 preceding months (sometimes referred to as the lookback month). The month elected is deemed to be the "applicable month." Note that if the full corporate bond yield curve (without regard to averaging) is used, then the month that includes the valuation date must be used to determine the interest rate (the prior 4 months are not available).
- The default interest assumption is an election to use the segment rates, as published for the valuation month. An election must be made to use any of the four prior months. This election can be made in a plan year without obtaining IRS approval (regulation 1.430(h)(2)-1(e)(2)). Any subsequent change in the lookback month (including back to the default) is an election change for which IRS approval must be obtained.

- Determination of MAP-21 stabilized segment rates (Revenue Notice 2012-61, Revenue Notice 2021-48)
  - Each of the 3 segment rates is adjusted (if necessary) to fall within a specified range. Only the segment rates that fall outside of the range are adjusted – the others are unchanged under MAP-21.
  - The range is based on a segment rate that is determined using the average of the last 25 years of segment rates for the period ending on 9/30 of the calendar year preceding the first day of the current plan year. This average of the 25-year segment rates cannot be less than 5%.
    - Note that the valuation date is irrelevant with regard to the prior 9/30 date used. For example, for the 2013 plan year, the 25-year average segment rate is determined as of 9/30/2012, regardless of whether the valuation date is 1/1/2013 or 12/31/2013. Similarly, for a plan year that begins on 11/1/2013 and ends on 10/31/2014, the 25-year average segment rate is determined as of 9/30/2012 (because 2012 is the calendar year preceding the 11/1/2013 first day of the plan year).
  - The size of the ranges is phased in
    - For plan years beginning in the years 2020 through 2030, the MAP-21 adjusted segment rate must be no less than 95% and no more than 105% of the 25-year average segment rate.
    - For plan years beginning in 2031, the range is no less than 90% and no more than 110% of the 25-year average segment rate.
    - For plan years beginning in 2032, the range is no less than 85% and no more than 115% of the 25-year average segment rate.
    - For plan years beginning in 2033, the range is no less than 80% and no more than 120% of the 25-year average segment rate.
    - For plan years beginning in 2034, the range is no less than 75% and no more than 125% of the 25-year average segment rate.
    - For plan years beginning after 2034, the range is no less than 70% and no more than 130% of the 25-year average segment rate.

- Purposes for which MAP-21 stabilized segment rates are used (and not used)
  - MAP-21 segment rates generally are not used in years for which the full yield curve is elected.
    - Generally, if a plan sponsor has elected to use the full yield curve, IRS approval is required to change assumptions in order to begin using the segment rates.
    - Plans that are using the full yield curve for funding and the average value method for determining actuarial value of assets, the assumed rate of return is still limited by the MAP-21 third segment rate.
  - The MAP-21 rates <u>are</u> used for:
    - IRC section 430 funding
    - Applying benefit restrictions under IRC section 436 (including the determination of the AFTAP)
  - The MAP-21 rates <u>are not</u> used for:
    - Determining deductible limits under IRC section 404(o)
    - Calculating the minimum lump sum distribution under IRC section 417(e)(3)

- Mortality tables
  - A required mortality table is to be prescribed by the IRS.
  - The 2008 IRS static mortality table is provided in Treasury regulation 1.430(h)(3)-1(e) and has been updated each year. (Note that a unisex version of the static mortality tables is used to determine present values under IRC section 417(e)(3).) The static tables take future mortality improvement into account since they are updated each year.
  - A generational mortality table is provided in Treasury regulation 1.430(h)(3)-1(d). The generational table includes factors to reflect future mortality improvement.
  - The tables provide mortality for annuitants and non-annuitants.
    - The non-annuitant table is used for years prior to the annuity beginning date. Note that plans using no pre-retirement mortality funding assumption would not use the non-annuitant table.
    - The annuitant table is used for those participants in pay status, and for the years during which the annuity is expected to be paid for participants who have not yet begun to receive their annuities.
    - Plans with no more than 500 participants (active and inactive) are allowed to use a combined static table applying the same mortality to annuitants and non-annuitants.
  - A plan may use a different mortality table upon IRS approval.
    - The plan must be in existence for a sufficient period of time in order to have enough experience to demonstrate the validity of the alternate mortality table.
    - There must be a sufficient number of plan participants.
    - The mortality table must reflect the experience of all pension plans maintained by the employer (including the entire controlled group).
    - All plans within the same controlled group must use the alternate table.
    - The alternate table may not be used for more than 10 years without applying for approval for an extension.
    - The request for approval must be submitted to the IRS at least 7 months before the plan year for which it will first be used.

Question 3

Valuation date: 1/1

Asset valuation method: Market value

Market value of assets (not including receivable contributions) as of:

1/1/2009
$300,000

Receivable contribution for 2008: $30,000, paid on 4/1/2009

Effective interest rate for calendar plan years:

2008	2009
4.75%	4.45%

What is the actuarial value of assets as of 1/1/2009?

Solution to question 3

The market values must be increased by the receivable contributions. For years beginning after 2008, the receivables must be adjusted by taking a present value using the effective interest rate for that year. (See IRC section 430(g)(4)(A).)

For 1/1/2009, the market value is adjusted to include the receivable contribution for 2008, discounted with interest for 3 months (from 4/1/2009 to 1/1/2009) using the 2008 effective rate of interest of 4.75%.

Actuarial value of assets on 1/1/2009 = $\$300{,}000 + \$30{,}000/1.0475^{3/12} = \$329{,}654$

Question 4

Valuation date: 12/31

Asset valuation method: Market value

Market value of assets as of 12/31/2009: $500,000

Contribution for 2008: $40,000, paid on 5/1/2009

Contribution for 2009: $60,000, paid on 7/1/2009

Effective interest rate for calendar plan years:

2008	2009
4.75%	5.15%

What is the actuarial value of assets as of 12/31/2009?

Solution to question 4

The market value must be reduced by the advance contribution for 2009. The advance contribution must be accumulated with interest to the 12/31/2009 valuation date using the 5.15% effective interest rate for 2009. (See IRC section 430(g)(4)(B).) Note that there is no adjustment for the 2008 contribution since it was contributed prior to the valuation date and is already included in the market value of assets.

Actuarial value of assets on 12/31/2009 = $500,000 – ($60,000 × $1.0515^{6/12}$) = $438,474

IMPORTANT

THESE FACTORS MAY BE USED FOR ALL QUESTIONS UNLESS OTHER FACTORS ARE PROVIDED, FOR BOTH SINGLE EMPLOYER AND MULTIEMPLOYER PLANS

2022 EA-2 (Segment F) Examination - Selected Commutation Factors
Interest Rates: 5.0%, 6.0%, and 7.0%

MALES	Interest Rate = 5.0%		Interest Rate = 6.0%		Interest Rate = 7.0%		MALES
Age	D_x	$N_x^{(12)}$	D_x	$N_x^{(12)}$	D_x	$N_x^{(12)}$	Age
60	50,097	681,130	28,367	350,697	16,149	182,683	60
61	47,407	632,266	26,591	323,144	14,996	167,062	61
62	44,837	586,037	24,912	297,323	13,918	152,560	62
63	42,380	542,326	23,325	273,138	12,910	139,104	63
64	40,032	501,022	21,825	250,501	11,966	126,627	64
65	37,787	462,019	20,406	229,326	11,084	115,065	65
66	35,640	425,216	19,065	209,535	10,259	104,359	66
67	33,586	390,518	17,797	191,051	9,487	94,454	67
68	31,621	357,832	16,598	173,803	8,765	85,298	68
69	29,740	327,073	15,463	157,725	8,090	76,843	69
70	27,937	298,159	14,389	142,755	7,457	69,043	70
71	26,209	271,014	13,371	128,832	6,865	61,857	71
72	24,550	245,565	12,407	115,903	6,310	55,246	72
73	22,956	221,746	11,492	103,916	5,790	49,175	73
74	21,424	199,492	10,623	92,822	5,303	43,608	74
75	19,949	178,745	9,799	82,576	4,845	38,515	75
76	18,528	159,447	9,015	73,137	4,416	33,866	76
77	17,159	141,546	8,270	64,463	4,013	29,634	77
78	15,839	124,992	7,562	56,517	3,635	25,794	78
79	14,565	109,737	6,888	49,264	3,281	22,321	79
80	13,336	95,736	6,247	42,670	2,948	19,193	80
81	12,151	82,943	5,639	36,701	2,635	16,389	81
82	11,012	71,314	5,062	31,327	2,344	13,887	82
83	9,918	60,804	4,516	26,516	2,071	11,668	83
84	8,870	51,366	4,001	22,236	1,818	9,713	84
85	7,869	42,955	3,515	18,458	1,583	8,003	85

FEMALES	Interest Rate = 5.0%		Interest Rate = 6.0%		Interest Rate = 7.0%		FEMALES
Age	D_x	$N_x^{(12)}$	D_x	$N_x^{(12)}$	D_x	$N_x^{(12)}$	Age
60	51,383	731,957	29,095	375,125	16,563	194,614	60
61	48,713	681,798	27,324	346,842	15,409	178,580	61
62	46,162	634,254	25,648	320,286	14,329	163,665	62
63	43,724	589,209	24,064	295,364	13,319	149,799	63
64	41,394	546,553	22,567	271,986	12,373	136,914	64
65	39,167	506,180	21,152	250,067	11,489	124,946	65
66	37,038	467,989	19,813	229,529	10,661	113,836	66
67	35,003	431,883	18,548	210,296	9,887	103,529	67
68	33,055	397,773	17,351	192,297	9,163	93,974	68
69	31,191	365,572	16,218	175,465	8,484	85,123	69
70	29,405	335,200	15,145	159,740	7,849	76,930	70
71	27,692	306,580	14,128	145,061	7,253	69,354	71
72	26,048	279,642	13,164	131,375	6,695	62,356	72
73	24,468	254,318	12,249	118,631	6,172	55,901	73
74	22,949	230,546	11,380	106,780	5,680	49,954	74
75	21,488	208,266	10,555	95,778	5,219	44,485	75
76	20,080	187,424	9,770	85,583	4,786	39,465	76
77	18,722	167,966	9,023	76,155	4,379	34,865	77
78	17,411	149,846	8,312	67,458	3,996	30,661	78
79	16,143	133,016	7,634	59,456	3,636	26,830	79
80	14,917	117,435	6,988	52,118	3,297	23,350	80
81	13,729	103,063	6,371	45,413	2,978	20,199	81
82	12,580	89,860	5,783	39,312	2,678	17,359	82
83	11,470	77,789	5,223	33,786	2,396	14,811	83
84	10,397	66,811	4,689	28,808	2,131	12,536	84
85	9,362	56,888	4,183	24,350	1,883	10,519	85

2022 EA-2 (Segment F) Examination - Selected Amortization Factors

Segment Rates = {5.0%, 6.0%, 7.0%}

Remaining Period	Amortization Factor
15 years	10.3758
14 years	9.9335
13 years	9.4647
12 years	8.9677
11 years	8.4409
10 years	7.8825
9 years	7.2906
8 years	6.6632
7 years	5.9982
6 years	5.2932
5 years	4.5460
4 years	3.7232
3 years	2.8594
2 years	1.9524

Solutions to EA-2(F) Examination
Fall, 2022

Question 1

The minimum required contribution is equal to the target normal cost plus the amortization of the shortfall bases plus the amortization of any waived funding deficiencies.

The funding shortfall is the excess of the funding target over the actuarial value of assets (reduced by the funding balances).

Funding shortfall$_{1/1/2023}$ = \$450,000 – \$500,000 = \$0

The funding shortfall cannot be less than \$0. When the funding shortfall is zero, there is no new shortfall amortization base, and the prior year shortfall bases are deemed to be fully amortized (IRC section 430(c)(6)).

In addition, the excess of the actuarial value of assets (reduced by the funding balances) over the funding target is a credit used to reduce the target normal cost (IRC section 430(a)(2)).

2023 minimum required contribution = \$250,000 – (\$500,000 – \$450,000) = \$200,000

The **smallest amount that satisfies the minimum funding standard** (\$X) as of 9/15/2024 is equal to the minimum required contribution, reduced by any funding balances, and increased with interest at the effective interest rate from 1/1/2023 to the date of the contribution. Note that it is important to know that the plan is not subject to quarterly contributions in 2023 because penalty interest would have applied to the late quarterly contributions.

$\$X = \$200{,}000 \times 1.05^{20.5/12} = \$217{,}384$

Answer is B.

Question 2

The funding target is equal to the present value of the benefit accrued as of the first day of the year. Smith is age 65 (normal retirement age under the general conditions of the exam) as of 1/1/2023, so the funding target will be equal to the present value of the future expected retirement benefits.
.
Treasury regulation 1.430(d)-1(f)(4)(ii)(B) requires that for funding purposes, a lump sum must generally be valued using the 417(e) mortality (post-retirement) and using the funding segment rates. However, regulation 1.430(d)-1(f)(4)(iii)(D) provides that when the plan equivalence for determining the lump sum value (at retirement age) is an interest rate other than the 417(e) applicable interest rate, then the lump sum is valued using the applicable mortality table for post-retirement mortality, and either the plan interest rate or the 417(e) applicable interest rate for post-retirement interest, whichever gives the larger present value.

In this question, the immediate annuity factor for determining the lump sum based upon the plan interest rate (12.621) is larger than the factor using the 417(e) applicable interest rate (11.461), so the plan interest rate of 5% is used.

$X = Funding target for Smith = $100 × 12 × 12.621 = $15,145

Answer is D.

Question 3

The amount of the required quarterly contribution installment under IRC section 430(j)(3)(D) is equal to 25% of the smaller of 90% of the minimum required contribution for the current year or 100% of the minimum required contribution for the preceding year.

In determining quarterly contribution installments for a plan year, if either the current year or the prior year is a short plan year, then the minimum required contribution in that calculation must be determined based upon whether the current plan year is a short year or a full year. If the current year is a full year and the prior year a short year, then the prior year minimum required contribution must be annualized to reflect what it would have been had the prior year been a full year. Alternatively, if the current year is a short year and the prior year a full year, then the prior year minimum required contribution must be pro-rated to reflect what it would have been had the prior year been a short year (covering the same number of months as the current short year). See Treasury regulation 1.430(j)-1(c)(7).

Because the prior year in this question was a short year, for purposes of taking 100% of the prior year minimum required contribution, the prior year short year minimum must be annualized. The statement is false.

Answer is B.