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01	A	**B**	C	D	E	14	**A**	B	C	D	E	27	**A**	B	C	D	E
02	A	**B**	C	D	E	15	A	**B**	C	D	E	28	A	B	C	**D**	E
03	A	B	**C**	D	E	16	A	B	C	D	**E**	29	A	B	**C**	D	E
04	A	B	C	**D**	E	17	A	B	**C**	D	E	30	A	**B**	C	D	E
05	A	B	**C**	D	E	18	A	B	C	**D**	E	31	A	B	C	**D**	E
06	A	B	C	D	**E**	19	A	B	C	**D**	E	32	A	**B**	C	D	E
07	A	**B**	C	D	E	20	**A**	B	C	D	E	33	A	**B**	C	D	E
08	A	B	**C**	D	E	21	A	**B**	C	D	E	34	A	**B**	C	D	E
09	A	B	C	D	**E**	22	A	**B**	C	D	E	35	A	B	C	D	**E**
10	A	B	**C**	D	E	23	A	B	**C**	D	E	36	**A**	B	C	D	E
11	A	**B**	C	D	E	24	**A**	B	C	D	E	37	A	**B**	C	D	E
12	A	**B**	C	D	E	25	A	B	**C**	D	E	38	**A**	B	C	D	E
13	A	B	C	**D**	E	26	**A**	B	C	D	E	39	A	B	C	**D**	E

PRACTICE QUESTIONS

Society of Actuaries (SOA)

EA1

Enrolled Actuaries Basic Examination

EDITION	QUESTIONS	FORMAT
Demo	9	Limited Edition PDF

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Before you begin

What this is

9 practice questions for Society of Actuaries (SOA) `EA1`, each with its answer key and an explanation. Answer a question before you read its key — the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, `EA1`
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

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QUESTION 1 SINGLE CHOICE

An actuarial student invests 1,000 today at an annual effective interest rate of i. At the end of n years, the accumulated value is 1,000(1.05)^n. Which of the following expressions gives the present value at time 0 of 1,000 payable at the end of n years at annual effective rate i = 0.05?

A 1000(1.05)^n

B **1000(1.05)^{-n}**

C 1000(1+0.05n)

D 1000/(1+0.05)

ANSWER **B**

WHY The present value of an amount payable at the end of n years at an annual effective rate i is the amount divided by (1+i)^n. With i = 0.05 and payment 1,000, PV = 1000(1.05)^(-n). Option A is the future value, not the present value. Option C represents simple (straight-line) interest, which is not the actuarial effective interest convention. Option D discounts only one year.

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QUESTION 2 SINGLE CHOICE

A 10-year annuity-immediate pays 1,000 at the end of each year. Interest is compounded annually at effective rate i = 0.06. Which expression represents the present value of this annuity?

A **1000 * (1 - (1.06)^{-10}) / 0.06**

B 1000 * ((1.06)^{10} - 1) / 0.06

C 1000 * (1 - (1.06)^{10}) / 0.06

D 1000 * (1.06)^{10}

ANSWER **A**

WHY The present value of an annuity-immediate with payment 1, payable n times at effective interest rate i, is a-angle-n at rate i = (1 - v^n)/i where v = 1/(1+i). For i = 0.06 and n = 10, PV = 1000 * (1 - (1.06)^{-10}) / 0.06. Option B is the future value (accumulated value) of an annuity-immediate. Option C uses (1+i)^n in the numerator instead of v^n and is not the standard formula. Option D is the future value of a single payment.

QUESTION 3 SINGLE CHOICE

An annuity-due pays 500 at the beginning of each year for 5 years. The annual effective interest rate is i = 0.04. Which expression gives the present value of this annuity-due?

A 500 * (1 - (1.04)^{-5}) / 0.04

B **500 * (1 - (1.04)^{-5}) / 0.04 * (1.04)**

C 500 * (1.04)^{5}

D 500 * ((1.04)^{5} - 1) / 0.04

ANSWER **B**

WHY The present value of an annuity-due equals the present value of the equivalent annuity-immediate multiplied by (1+i). PV(due) = PV(immediate) * (1+i) = 500 * (1 - 1.04^{-5}) / 0.04 * (1.04). Option A is the annuity-immediate present value. Option D is the future value of an annuity-immediate. Option C is the future value of a single payment of 500.

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QUESTION 4 MULTIPLE CHOICE

A borrower takes a 3-year loan of 10,000 at an annual effective rate of i = 0.10, repaid by level annual payments at the end of each year. Which of the following statements are correct? (Choose two.)

A **The annual payment equals 10,000 / a-angle-3 at i = 0.10.**

B **The interest portion of the first payment is greater than the interest portion of the third payment.**

C The principal portion of the first payment is greater than the principal portion of the third payment.

D The outstanding loan balance immediately after the first payment equals 10,000 * v - Payment * a-angle-2 at i = 0.10.

ANSWER **A · B**

WHY The level annual payment is the loan amount divided by the present value annuity factor, 10,000 / a-angle-3 at i = 0.10 (Option A is correct). Each year the outstanding balance declines, so interest in the nth payment (which is balance times i) declines as well; therefore interest in payment 1 > interest in payment 3 (Option B is correct). Conversely, principal portions increase over time, so the principal in payment 1 is less than in payment 3 (Option C is wrong). Option D would be the balance just BEFORE the first payment if the first payment had already been made for two years, which is not the right construction; the balance right after payment 1 is 10,000*(1.10) - Payment, equivalently the prospective method a-angle-2 at i = 0.10.

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QUESTION 5 SINGLE CHOICE

A fund earns a nominal interest rate of 8% compounded quarterly. What is the equivalent annual effective interest rate i?

A 0.02

B 0.08

C **(1.02)^4 - 1**

D 4 * 0.02

ANSWER C

WHY A nominal rate i^(m) compounded m times per year equals an annual effective rate of (1 + i^(m)/m)^m - 1. With i^(4) = 0.08, m = 4, i = (1 + 0.08/4)^4 - 1 = (1.02)^4 - 1. Option A is the rate per quarter, not the effective annual rate. Option B is the nominal rate, not effective. Option D is simply 4 times the quarterly rate without compounding.

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QUESTION 6 SINGLE CHOICE

A 10-year bond pays coupons of 50 annually (based on a 1,000 par value, coupon rate 5%) and repays par at maturity. The yield rate (annual effective) is i = 0.06. Which expression gives the price of the bond?

A **50 * a-angle-10 at 0.06 + 1000 * v^10 at 0.06**

B 50 * a-angle-10 at 0.05 + 1000 * v^10 at 0.05

C 1000 * (1.06)^{10} - 50 * s-angle-10 at 0.06

D 1000

ANSWER A

WHY The price of a coupon bond at yield i equals the present value of the coupons plus the present value of the redemption value, both discounted at the yield. With coupons of 50 for 10 years and redemption of 1,000, Price = 50 * a-angle-10 at 0.06 + 1000 * v^10 at 0.06. Option B uses the coupon rate instead of the yield, which gives par only by coincidence. Option C, after algebraic rearrangement, would equal the future value at time 10, not the present value. Option D ignores discounting.

QUESTION 7 SINGLE CHOICE

A bond is purchased at a price above par value. Which of the following statements describes the relationship between the coupon rate and the yield rate?

A The coupon rate is less than the yield rate, and the premium is amortized (decreases) over time.

B The coupon rate equals the yield rate, so the price remains constant at par.

C **The coupon rate is greater than the yield rate, and the premium is amortized (decreases) over time.**

D The coupon rate is greater than the yield rate, and the bond's book value increases over time.

ANSWER **C**

WHY A bond sells at a premium when its coupon rate exceeds the yield (market) rate. As the bond approaches maturity, the premium amortizes and the book value declines toward par. Option A describes a discount bond, the opposite situation. Option B describes a par bond. Option D is wrong because when premium amortizes, book value decreases toward par, not increases.

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QUESTION 8 MULTIPLE CHOICE

Consider two zero-coupon bonds: a 1-year bond with spot rate s1 and a 2-year bond with spot rate s2. Which of the following statements are correct? (Choose two.)

A **The 1-year forward rate for year 2, denoted f_{1,2}, satisfies (1+s2)^2 = (1+s1)(1+f_{1,2}).**

B If s2 > s1, then f_{1,2} > s1 necessarily.

C If s2 > s1, then f_{1,2} > s2 necessarily.

D **The relationship between spot rates and forward rates can be derived from no-arbitrage arguments.**

ANSWER **A · D**

WHY From the no-arbitrage condition, investing for 2 years at the 2-year spot rate must equal investing for 1 year at s1 and then reinvesting at the 1-year forward rate f_{1,2}: (1+s2)^2 = (1+s1)(1+f_{1,2}). Therefore A is correct and D is correct. When the term structure is upward sloping (s2 > s1), the forward rate f_{1,2} lies between s1 and s2, not necessarily greater than either. Thus B and C are incorrect.

QUESTION 9 SINGLE CHOICE

A perpetuity-immediate pays 100 at the end of each year forever, with the first payment one year from now. The annual effective interest rate is i = 0.05. What is the present value of this perpetuity?

A 100 * (1.05)

B **100 / 0.05**

C 100 * (1 - (1.05)^{-infinity}) / 0.05

D 100 * ((1.05)^{infinity} - 1) / 0.05

ANSWER **B**

WHY The present value of a perpetuity-immediate with payment P at rate i is P/i. With P = 100 and i = 0.05, PV = 100/0.05 = 2,000. Option A multiplies by (1+i), which converts an immediate perpetuity into a due perpetuity. Option C is the limiting form of an annuity-immediate as n → infinity; it is indeterminate because 1.05 raised to a negative infinity does not lead to a clean closed form equal to 100/i without justification. Option D is the future value of an annuity-immediate, which diverges.

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