

## **2008 Level 1 Mock Exam Volume 4**

### **Answers**

5. A

Study Session 1-2-b

Distinguish between conduct that conforms to the Code and Standards and conduct that violates the Code and the Standards

Takeda may rely on and issue reports based on third-party research providers if he has no reason to question the soundness or reliability of their research and he appropriately references his sources. He also appropriately discloses his interest in the company.

6. C

Study Session 1-2-b

Distinguish between conduct that conforms to the Code and Standards and conduct that violates the Code and the Standards

By communicating this information to his father prior to release of the report, Gunard failed to put the firm's clients' interests above his own. Nothing in the question indicates that he did not have a reasonable basis for his recommendation; he conducted a thorough fundamental analysis and his report was approved. The fact that Gunard's father had already disposed of the shares does not negate the fact that Gunard violated a duty to the firm's clients.

7. A

Study Sessions 1-1-c, 1-2-b

Explain the ethical responsibilities required by the Code and Standards, including the multiple subsections of each Standard;

Distinguish between conduct that conforms to the Code and Standards and conduct that violates the Code and the Standards

A member in possession of material nonpublic information that could affect the value of an investment may not act or cause others to act on the information.

8. D

Study Sessions 1-1-c, 1-2-b

Explain the ethical responsibilities required by the Code and Standards, including the multiple subsections of each Standard;

Distinguish between conduct that conforms to the Code and Standards and conduct that violates the Code and the Standards

Conduct covered and prohibited under Standard VII (A) includes cheating on the CFA examination or any other examination.

9. A

Study Sessions 1-1-c, 1-2-b

Explain the ethical responsibilities required by the Code and Standards, including the multiple

subsections of each Standard;

Distinguish between conduct that conforms to the Code and Standards and conduct that violates the Code and the Standards

Activities that would normally violate a member's duty to his employer (such as copying employer records) may be justified. Such action would be permitted only if the intent is clearly aimed at protecting clients or the integrity of the market and not for personal gain.

11. D

Study Session 1-2-a

Demonstrate a thorough knowledge of the Code of Ethics and Standards of Professional Conduct by applying the Code and Standards to specific situations presenting multiple issues of questionable professional conduct

Members must not knowingly make statements of assurances or guarantees regarding an investment.

21. B

Study Session 2-6-a

calculate and interpret the net present value (NPV) and the internal rate of return (IRR) of an investment, contrast the NPV rule to the IRR rule, and identify problems associated with the IRR rule

Calculate and interpret the net present value (NPV) and the internal rate of return (IRR) of an investment, contrast the NPV rule to the IRR rule, and identify problems associated with the IRR rule. The NPV equals the present value (at time = 0) of the future cash flows discounted at the opportunity cost of capital (12%) minus the initial investment, or \$10,558 ( $CF_0 = -500,000$ ,  $CF_1 = 100,000$ ,  $CF_2 = 200,000$ ,  $CF_3 = 100,000$ ,  $CF_4 = 300,000$ ,  $i = 12$ , solve for  $NPV = 10,557.94 \approx 10,558$ ).

23. D

Study Session 2-6-d

Calculate and interpret the bank discount yield, holding period yield, effective annual yield, and money market yield for a U.S. Treasury bill; and convert among holding period yields, money market yields, effective annual yields, and bond equivalent yields

The money market yield is computed by annualizing the holding period yield (HPY) assuming a 360-day year. In this case, the HPY is  $(100,000 - 96,500) / 96,500 = 3.627\%$  and the money market yield  $= 3.627\% \times (360 / 270) = 4.836\%$ . The effective annual yield (EAY) compounds the HYP forward to one year (assuming a 365-day year). In this case, the EAY  $= (1 + 0.03627)^{365 / 270} - 1 = 4.934\%$ .

24. B

Study Session 2-7-c

Calculate and interpret relative frequencies and cumulative relative frequencies, given a frequency distribution, and describe the properties of a dataset presented as a histogram or a frequency polygon.

The relative frequency is the number of observations in an interval divided by the total number of observations. For Interval III, relative frequency  $= 22 / 110 = 20\%$ .

The cumulative relative frequency is the sum of the relative frequencies of the relevant class and all

the classes before it. For Interval III, the cumulative relative frequency =  $(24 + 48 + 22) / 110 = 85.45\% \approx 85\%$ .

25. A

Study Session 2-7-f

Define, calculate, and interpret 1) a range and a mean absolute deviation, and 2) the variance and standard deviation of a population and of a sample

First, compute the mean portfolio return =  $(8.6 + 11.2 + 12.9 + 15.1 - 9.4) / 5 = 7.68\%$

Mean absolute deviation =  $(|8.6 - 7.68| + |11.2 - 7.68| + |12.9 - 7.68| + |15.1 - 7.68| + |-9.4 - 7.68|) / 5 = 6.83\%$

Variance =  $[(8.6 - 7.68)^2 + (11.2 - 7.68)^2 + (12.9 - 7.68)^2 + (15.1 - 7.68)^2 + (-9.4 - 7.68)^2] / 5 = 77.4536 \approx 77.5$

The population variance calculation is appropriate because the analyst is analyzing all the annual returns on the portfolio since its inception.

26. A

Study Session 2-7-h

Define, calculate, and interpret the coefficient of variation and the Sharpe ratio

Coefficient of variation = standard deviation / arithmetic mean return =  $3800.5 / 14.3 = 19.49 / 14.3 = 1.36$

Sharpe ratio = (mean return - risk free rate) / standard deviation of returns =  $(14.3 - 4.25) / 19.49 = 0.52$

30. C

Study Session 2-9-g

Construct and interpret a confidence interval for a normally distributed random variable, and determine the probability that a normally distributed random variable lies inside a given confidence interval

The 99% confidence interval for a normally distributed random variable is equal to the sample mean  $\pm 2.58 \times$  sample standard deviation. In this case, the 99% confidence interval =  $42 \pm (2.58 \times 9^{0.5}) = 42 \pm (2.58 \times 3) = 42 \pm 7.74 \approx 34.3$  to  $49.7$ .

33. B

Study Session 5-20-a, d

Describe the characteristics of monopolistic competition and oligopoly; explain the kinked demand curve model and the dominant firm model, and describe oligopoly games including the Prisoners' Dilemma

The game of Prisoners' Dilemma applies to oligopoly and the solution from Nash equilibrium is that both prisoners would confess to the crime.

34. C

Study Session 4-15-c

Explain the impact of taxes on supply, demand, and market equilibrium, and describe tax incidence and its relation to demand and supply elasticity

In the extreme cases of products with perfectly elastic and perfectly inelastic demand, the sellers and buyers, respectively, pay the entire tax.

35. C

Study Session 4-14-b

Distinguish between the price and the value of a product and explain the demand curve and consumer surplus

The consumer surplus is the value of the good minus the price paid for it  $(10-4) = 6$ , summed over the quantity bought. The total consumer surplus is the consumer surplus on each mango that Reddy buys and added together. It is the area of the right triangle =  $(\text{base} \times \text{height}) / 2$  as in Figure 3 on p. 40, with base equal to 20 mangoes a week and the height equal to 6, the consumer surplus on each mango. Thus the total consumer surplus =  $(20 \times 6) / 2 = \text{Rs.}60$

36. B

Study Session 6-27-a

Explain supply-side effects on employment, potential GDP, and aggregate supply, including the income tax and taxes on expenditure, and describe the Laffer curve and its relation to supply-side economics

The relationship between the tax rate and the amount of tax revenue collected is called the Laffer curve, named after Arthur B. Laffer, a supply-side economist and a member of President Reagan's economic policy advisory board. They argued that tax cuts would increase tax revenues and decrease the budget deficit.

37. A

Study Session 4-16-a

Explain the types of opportunity cost and their relation to economic profit, and calculate economic profit

Opportunity costs =  $100,000 + 50,000 + 40,000 = 190,000$

Economic depreciation =  $300,000 - 280,000 = 20,000$

Economic profit = Total revenue – Opportunity costs – Economic depreciation

$$300,000 - 190,000 - 20,000 = 90,000$$

38. B

Study Session 4-15-d

Discuss the impact of subsidies, quotas, and markets for illegal goods on demand, supply, and market equilibrium

Upon introduction of a subsidy, the equilibrium level of supply increases and the price falls. In the new equilibrium, marginal cost (on the supply curve) exceeds marginal benefit (on the demand curve) and a deadweight loss arises due to overproduction

39. B

Study Session 5-23-c

Differentiate between short-run and long-run macroeconomic equilibrium, and explain how economic growth, inflation, and changes in aggregate demand and supply influence the macroeconomic

equilibrium and the business cycle

A below full-employment equilibrium is a macro-economic equilibrium in which potential GDP exceeds real GDP. The amount by which potential GDP exceeds real GDP is called the Okun gap. An above full-employment equilibrium is a macro-economic equilibrium in which real GDP exceeds potential GDP. The amount by which real GDP exceeds potential GDP is called an inflationary gap.

40. C

Study Session 4-13-a

Calculate and interpret the elasticities of demand (price elasticity, cross elasticity, income elasticity) and the elasticity of supply, and discuss the factors that influence each measure

The elasticity of supply equals the percent change in quantity relative to the average quantity divided by the percent change in demand relative to the average demand.

The average quantity =  $(100 + 150) / 2 = 125$ , the % change in quantity =  $50 / 125 = 40$ ;

The average price =  $(150 + 200) / 2 = 175$ , the % change in price =  $50 / 175 = 28.6$

Elasticity of supply =  $40 / 28.6 = 1.40$

41. A

Study Session 6-27-b

Discuss the sources of investment finance and the influence of fiscal policy on capital markets, including the crowding-out effect

A deficit budget leads to an increase in interest rates, a decrease in investment, and an increase in private saving.

42. C

Study Session 5-21-g

Differentiate between renewable and non-renewable natural resources and describe the supply curve for each

The Hotelling principle applies to non-renewable natural resources characterized by perfectly elastic flow supply. According to the Hotelling principle, the price of resource is expected to rise at a rate equal to the interest rate

43. C

Study Session 4-13-b

Calculate elasticities on a straight-line demand curve, differentiate among elastic, inelastic, and unit elastic demand and describe the relation between price elasticity of demand and total revenue

When demand is elastic, a decrease in price by 1% increases the quantity sold by more than 1% and it results in an increase in total revenue. But when demand is inelastic, a decrease in price by 1% increases the quantity sold by less than 1% and it results in a decrease in total revenue.

44. B

Study Session 5-22-a

Describe the phases of the business cycle, define an unemployed person, and interpret the main labor market indicators and their relation to the business cycle

The three indicators of the state of the labor market that the U.S. Census Bureau calculates are: the

unemployment rate, the labor force participation rate, and the employment-to-population ratio.

45. C

Study Session 10-41-d, 11-46-a

Calculate and interpret activity, liquidity, solvency, profitability, and valuation ratios; calculate and interpret liquidity measures using selected financial ratios for a company and compare it with peer companies

An increase in receivables turnover would indicate that receivables were outstanding for a shorter period of time, decreasing the cash conversion cycle.

47. A

Study Sessions 10-41-d, 11-46-a

Calculate and interpret activity, liquidity, solvency, profitability, and valuation ratios;

Calculate and interpret liquidity measures using selected financial ratios for a company and compare it with peer companies

Total asset turnover increased over the period, but turnovers related to the cash conversion cycle decreased or remained relatively stable. The fixed asset turnover had to have increased to offset the decline in inventory and accounts receivable turnovers.

50. D

Study Session 8-34-h

Analyze and interpret a cash flow statement using both total currency amounts and common-size cash flow statements

The increase in inventory (working capital investment) would reduce cash flow from operations relative to net income.

54. D

Study Session 8-32-f

Distinguish between the operating and nonoperating components of the income statement

The loss on the disposal of fixed assets is an unusual or infrequent item but it is still part of normal operating activities. The interest expense is the result of financing activities and would be classified as a nonoperating expense by nonfinancial service companies.

58. B

Study Session 9-38-d

Explain the factors that determine whether a company's deferred tax liabilities should be treated as a liability or as equity for purposes of financial analysis

The classification of deferred taxes as liabilities or equity depends on the likelihood, or expectation, of reversal. For growing firms and those using accelerated methods of depreciation, the temporary differences tend not to reverse. If the analyst determined the deferred tax liabilities were likely to reverse, and hence should be classified as liabilities, then it would be appropriate to discount them at the company's average discount rate. But the discount rate is not a factor in determining if reversal is likely.

59. C

Study Session 9-40-d

Distinguish between sales-type leases and direct financing leases and explain the effects of these types of leases on the financial statements of lessors

It is a sales type lease: the lease period covers more than 75% of its useful life (5/6) and the asset is on their books at less than the present value of the lease payments (\$199,635) ( $PMT = \$50,000$ ,  $N=5$ ,  $i=8\%$ ). They must have acquired or manufactured the asset if it is recorded at less than the present value of the lease payments. As a sales type lease they will recognize gross profit for the difference of the present value and the cost ( $199,635 - 160,000 = 39,635$ ) and then interest income on the net investment in the lease ( $0.08 \times 199,635 = 15,971$ ).

63. D

Study Session 9-35-c, e

compare and contrast the effect of the different methods on cost of goods sold and inventory balances, and discuss how a company's choice of inventory accounting method affects other financial items such as income cash flow, and working capital;

indicate the reasons that a LIFO reserve might decline during a given period and evaluate the implications of such a decline for financial analysis

The LIFO reserve increased by \$30,000. If an increase in the LIFO reserve occurs, LIFO cost of goods sold will be higher than FIFO by the amount of the increase and net income would be lower than FIFO by  $\$30,000(1 - 0.30) = \$21,000$ . After-tax FIFO net income would be \$21,000 higher.

64. A

Study Session 9-35-c, d

compare and contrast the effect of the different methods on cost of goods sold and inventory balances, and discuss how a company's choice of inventory accounting method affects other financial items such as income cash flow, and working capital;

compare and contrast the effects of the choice of inventory method on profitability, liquidity, activity, and solvency ratios

Adding the ending balance in the LIFO reserve to the LIFO inventory would equal the ending balance for inventory on a FIFO basis.

70. C

Study Session 11-46-a

Calculate and interpret liquidity measures using selected financial ratios for a company and compare it with peer companies

The company's days sales outstanding is considerably higher than the industry's, which means the company is slower in collecting its receivables than the average firm. This is a concern because the longer receivables are outstanding, the greater the probability they will not be collected and will have to be charged off, thereby adversely affecting earnings.

79. C

Study Session 13-53-a

compare and contrast the characteristics of, and discuss the source and direction of bias exhibited by,

each of the three predominant weighting schemes used in constructing stock market indexes, and compute a price-weighted, value-weighted, and un-weighted index series for three stocks; The Value Line Index, an un-weighted index, uses the geometric mean return approach where as the Nikkei-Dow Jones Average, a price-weighted index, uses the arithmetic mean approach.

80. B

Study Session 14-58-d, e

Discuss the specific advantages of both the concentration ratio and the Herfindahl index; discuss, with respect to global industry analysis, the elements related to risk, and describe the basic forces that determine industry competition

$$\text{Herfindahl Index} = 0.5^2 + 0.25^2 + 0.15^2 + 0.1^2 = 0.25 + 0.0625 + 0.0225 + 0.01 = 0.345$$

$$\text{"Equivalent Number" of firms} = 1 / 0.345 = 2.8986 \approx 2.90$$

81. C

Study Session 14-60-e

Estimate the implied dividend growth rate, given the components of the required return on equity and incorporating the earnings retention rate and current stock price

$$g = \text{RR} \times \text{ROE}$$

$$\text{RR} = (1 - \text{Payout Ratio}) = 1 - 0.25 = 0.75$$

$$\text{Financial Leverage} = \text{TA} / \text{Equity}$$

$$\text{Debt} = \text{TA} \times \text{Debt Ratio} = \text{CNY } 50 \text{ m} \times 0.4 = \text{CNY } 20 \text{ m}$$

$$\text{Equity} = \text{CNY } 50 \text{ m} - \text{CNY } 20 \text{ m} = \text{CNY } 30 \text{ m}$$

$$\text{ROE} = \text{ROA} \times \text{Financial Leverage}; \text{ROE} = 10\% \times (50/30) = 16.67\%$$

$$g = 0.75 \times 16.67 = 12.50\%$$

82. C

Study Session 13-52-f

Describe the process of selling a stock short and discuss an investor's likely motivation for selling short

Short sales have no time limits. However, if the lender of shares decides to sell them, the broker must find another investor willing to lend the shares.

83. D

Study Session 14-60-f

Describe a process for developing estimated inputs to be used in the DDM, including the required rate of return and expected growth rate of dividends

In estimating the value of total firm, the free cash flow available to both stockholders and bondholders should be used. Therefore, operating cash flow before debt related costs and after subtracting the required capital expenditures is the appropriate measure of free cash flow. As the value of the total firm includes the value of equity and the value of debt, the weighted average cost of capital is the relevant discount rate.

84. D

Study Sessions 2-5-d; 4-45-h; 14-60-b, e



Calculate and interpret the future value (FV) and present value (PV) of a single sum of money, an ordinary annuity, an annuity due, a perpetuity (PV only) and a series of unequal cash flows;  
 calculate and interpret the cost of equity capital using the capital asset pricing model approach, the dividend discount model approach, and the bond-yield-plus risk-premium approach;  
 calculate and interpret the value both of a preferred stock and a common stock using the dividend discount model (DDM);

estimate the implied dividend growth rate, given the components of the required return on equity and incorporating the earnings retention rate and current stock price

$$g = \text{growth rate of dividends} = 7\% [(3/2)^{1/6}]; k = 9 + 1.8(17 - 9) = 23.4\%$$

$$V = 3(1.07) / (0.234 - 0.07) = 19.57 \text{ pesos.}$$

The stock's intrinsic value > price, so it is undervalued.

85. D

Study Session 14-61-b

Calculate and interpret P/E, P/BV, P/S, and P/CF

In a rising costs environment, FIFO would result in higher earnings, higher ending inventory, as well as higher book value of equity. Thus, both P/E and P/BV tend to be understated relative to a comparable firm that uses LIFO method.

87. C

Study Sessions 11-45-h, 14-60-e

Calculate and interpret the cost of equity capital using the capital asset pricing model approach, the dividend discount model approach, and the bond-yield-plus risk-premium approach;

Estimate the implied dividend growth rate, given the components of the required return on equity and incorporating the earnings retention rate and current stock price

$$V_0 = D_1 / (k - g); \$40 = \$2 / (0.12 - g); g = 7\%;$$

$$g = \text{ROE} \times \text{RR}; \text{RR} = 7 / 10 = 0.70;$$

$$\text{Payout Ratio} = 1 - \text{RR} = 1 - 0.70 = 0.30 = 30\%.$$

89. B

Study Session 13-55-d

Explain why a mispricing may persist and why valid anomalies may not be profitable

The persistent realization of abnormal returns is referred to as an anomaly and survivorship bias is a source of unreliability of an anomaly.

90. B

Study Sessions 12-51-e, 14-60-b

Calculate, using the SML, the expected return on a security and evaluate whether the security is overvalued, undervalued, or properly valued;

calculate and interpret the value both of a preferred stock and a common stock using the dividend discount model (DDM)

$$\text{Most recent dividend} = 2.00(0.6) = 1.20$$

$$k_s = 4.20 + 5.60(1.50) = 12.60\%;$$

$$V = 1.20(1.051) / (0.126 - 0.051) = \$16.82$$

95. D

Study Session 17-71-d

Describe the characteristics of equity forward contracts and forward contracts on zero-coupon and coupon bonds

When the coupon rate of a bond is greater than the yield to maturity, the bond trades at a premium. This is accurate for bond forward contracts.

98. D

Study Session 15-65-c

Explain the basic theories of the term structure of interest rates and describe the implications of each theory for the shape of the yield curve

The Liquidity Preference Theory asserts that market participants want to be compensated for the interest rate risk associated with holding long-term bonds. The longer the maturity, the greater the price volatility when interest rates change and investors want to be compensated for this risk. According to the Liquidity Preference Theory, the term structure of interest rates is determined by expectations about future rates and a yield premium for interest rate risk. Because interest rate risk increases with maturity, The Liquidity Preference Theory asserts that the yield premium increases with maturity.

102. D

Study Session 16-68-f

Differentiate between the nominal spread, the zero-volatility spread, and the option-adjusted spread

The difference between the Z-spread and the nominal spread is greater for issues in which the principal is repaid over time rather than only at maturity. In addition, the difference between the Z-spread and the nominal spread is greater in a steep yield curve environment.

106. D

Study Session 16-69-d

Compute and interpret the effective duration of a bond, given information about how the bond's price will increase and decrease for given changes in interest rates, and compute the approximate percentage price change for a bond, given the bond's effective duration and a specified change in yield

$$\text{Effective duration} = (V_- - V_+) / (2 \times V_0 \times \Delta y)$$

$$\text{Duration for Bond A} = (102.97 - 101.04) / (2 \times 102.00 \times 0.005) = 1.89$$

$$\text{Duration for Bond B} = (94.07 - 83.81) / (2 \times 88.69 \times 0.005) = 11.57$$

107. C

Study Session 16-65-e, i

Compute, compare, and contrast the various yield spread measures; compute the after-tax yield of a taxable security and the tax-equivalent yield of a tax-exempt security

$$\text{Taxable equivalent yield} = (\text{tax-exempt yield}) / (1 - \text{marginal tax rate}) = 3.86 / (1 - 0.32) = 5.68\%$$

$$\text{Yield ratio} = (\text{yield on tax-exempt bond}) / (\text{yield of US Treasury}) = 3.86 / (3.86 + 100\text{bp}) = 3.86 / 4.86 =$$

0.79

111. D

Study Session 18-76-e

Describe the various approaches to the valuation of real estate

The after-tax cash flow approach requires specific information about the investor's marginal tax rate.

The value of the property is dependent on the investor's marginal tax rate.

112. B

Study Session 18-76-i

Discuss the descriptive accuracy of the term "hedge fund," define hedge fund in terms of objectives, legal structure, and fee structure, and describe the various classifications of hedge funds

Hedge funds focus on absolute returns and place specific bets in the search for positive alphas. Because the fee structure includes a small base fee plus an incentive fee proportional to profits, hedge funds have an option-like fee structure.

113. B

Study Session 18-76-l

Discuss the performance of hedge funds, the biases present in hedge fund performance measurement, and explain the effect of survivorship bias on the reported return and risk measures for a hedge fund database

Survivorship bias affects both the returns and the risk (standard deviation) reported for the hedge funds. Hedge funds with low or negative returns will be excluded from the index as will funds with high volatility; those funds will not survive for eight years. If only the successful funds remain in the index, the returns are overstated and the risk is understated. Overstated returns and understated risk will tend to overstate the Sharpe ratio.

115. A

Study Session 12-51-c

Define systematic and unsystematic risk, and explain why an investor should not expect to receive additional return for assuming unsystematic risk

Unsystematic risk (risk that can be diversified away) is not rewarded. Systematic risk is the risk for which investors are compensated. Systematic risk is that part of total risk that is correlated with the market and related to changes in macroeconomic variables (such as changes in interest rate volatility). Standard deviation of returns of the market portfolio is a measurement of systematic risk.

116. C

Study Session 12-50-f

describe the efficient frontier, and explain the implications for incremental returns as an investor assumes more risk

The efficient frontier is curved. As an investor moves up the curve, risk increases and the slope decreases. The decreasing slope means that adding equal increments of risk provide diminishing

increments of expected return.

117. A

Study Session 12-50-d

compute and interpret the covariance of rates of return, and show how it is related to the correlation coefficient

If the covariance of returns between two assets is a positive number, the correlation coefficient for those two assets cannot be negative. The correlation coefficient is equal to the covariance standardized by the product of the individual standard deviations (which are always positive).

118. C

Study Session 12-51-e

calculate, using the SML, the expected return on a security, and evaluate whether the security is overvalued, undervalued, or properly valued

In equilibrium the estimated rate of return is equal to the required return. The CAPM required rate of return =  $3\% + (1.2 \times 9\%) = 13.8\%$ .

119. C

Study Session 12-49-a, b, c

describe the steps in the portfolio management process, and explain the reasons for a policy statement;

explain why investment objectives should be expressed in terms of risk and return, and list the factors that may affect an investor's risk tolerance;

describe the return objectives of capital preservation, capital appreciation, current income, and total return

The investment objective must be expressed in terms of both risk and return and current income from dividends and interest represents only the investor's return objective. It does not include any reference to risk tolerance or risk limits as provided in the other alternatives.

120. A

Study Session 12-50-c

compute and interpret the expected return, variance, and standard deviation for an individual investment and the expected return and standard deviation for a portfolio

The expected return of an asset is the weighted average of the possible returns =  $(0.35 \times 8) + (0.30 \times 10) + (0.25 \times 16) + (0.10 \times 20) = 11.8\%$ .

The expected standard deviation is calculated as follows:  $\sigma^2 = 0.35 \times (8 - 11.8)^2 + 0.30 \times (10 - 11.8)^2 + 0.25 \times (16 - 11.8)^2 + 0.10 \times (20 - 11.8)^2 = 15.31$

$s = (15.31)^{0.5} = 3.91\%$