Cost Management

All the process involved in planning, estimating, budgeting and controlling costs so that the project can be completed within the approved budget.
Cost Management

- Primarily concerned with cost of resources.
- Also concerned with
  - Life-cycle costing
  - Opportunity cost
  - Sunk costs
- The Cost Management Plan is part of overall project management plan.
  - Control thresholds
  - Earned value rules
  - Reporting formats
7.1 Plan Cost Management

- Defining the rules which are used to manage project costs.

- It defines how the team will manage the money.
Cost Management

7.1 Plan Cost Management

Inputs
1. Project management plan
2. Project charter
3. Enterprise environmental factors
4. Organizational process assets

Tools & Techniques
1. Expert judgment
2. Analytical techniques
3. Meetings

Outputs
1. Cost management plan
Cost Management

7.2 Estimate Costs

- Developing an approximation of the costs of the resources needed to complete each schedule activity

- Cost Estimating ≠ Pricing
7.2 Estimate Cost

**Inputs**
1. Cost management plan
2. Human resource management plan
3. Scope baseline
4. Project schedule
5. Risk register
6. Enterprise environmental factors
7. Organizational process assets

**Tools & Techniques**
1. Expert judgment
2. Analogous estimating
3. Parametric estimating
4. Bottom-up estimating
5. Three-point estimating
6. Reserve analysis
7. Cost of quality
8. Project management software
9. Vendor bid analysis
10. Group decision making techniques

**Outputs**
1. Activity cost estimates
2. Basis of estimates
3. Project documents updates
Cost Management

Accuracy of estimates increases as the project progresses
  ○ Rough Order of Magnitude
    ±50%
  ○ Budget Estimate or the budget
    ±10%
Cost Management

7.3 Determine Budget

Aggregating the cost estimates of individual activities or work packages to establish a total cost baseline.
Cost Management
Accounting Terms

- **Variable Costs** – Costs that change as the units produced changes.
- **Fixed Costs** – Costs that do not change with changes to volume produced.
- **Direct Costs** – Costs that are directly attributed to project work.
- **Indirect Costs** – Items that benefit more than one project and are not attributed to a specific activity.
- **Value Analysis or Engineering** – Finding less costly ways to do the same work.
Cost Management
7.3 Determine Budget

Inputs
1. Cost management plan
2. Scope baseline
3. Activity cost estimates
4. Basis of estimates
5. Project schedule
6. Resource calendars
7. Risk register
8. Agreements
9. Organizational process assets

Tools & Techniques
1. Cost aggregation
2. Reserve analysis
3. Expert judgment
4. Historical relationships
5. Funding limit reconciliation

Outputs
1. Cost baseline
2. Project funding requirements
3. Project document updates
The difference between the maximum funding and the end of the cost baseline is Management Reserve.

Cost Baseline
Actual Costs
Funding Requirements

Cumulative $

Time

Cost Management

- Funding Requirements
7.4 Control Costs

- Influencing the factors that create changes to the cost baseline
- Ensuring requested changes are agreed upon
- Managing the actual changes when and as they occur
- Assuring that potential cost overruns do not exceed the authorized funding periodically and in total for the project

Cost Management

Monitoring and Controlling Process Group

7. Project Cost Management

7.4 Control Costs
Cost Management
7.4 Control Costs

Inputs
.1 Project management plan
.2 Project funding requirements
.3 Work performance data
.4 Organizational process assets

Tools & Techniques
.1 Earned value management
.2 Forecasting
.3 To-complete performance index
.4 Performance reviews
.5 Project management software
.6 Reserve analysis

Outputs
.1 Work performance information
.2 Cost forecasts
.3 Change requests
.4 Project management plan updates
.5 Project document updates
.6 Organizational process assets updates
Cost Management

Cumulative Cost Curve

- PV (Planned Value)
- AC (Actual Cost)
- EV (Earned Value)
- EAC (Estimated At Completion)
- BAC (Budget At Completion)
- SLIPPAGE
- SCHEDULE VARIANCE
- COST VARIANCE
- NOW
- TIME

Cumulative Cost Curve
Cost Management

In Alphabetical Order

- Actual Costs
- Earned Value
- Planned Value

CV = Minus SV
CPI = Divided By SPI

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Cost Management
Forecasting – ETC

- ETC based on new estimate
- ETC based on atypical variances
  - ETC = BAC – EV
- ETC based on typical variances
  - ETC = (BAC – EV) / CPI
- ETC based on both the CPI & SPI
  - ETC = (BAC – EV) / (CPI * SPI)

BAC = Budget at Completion
BAC-EV = Remaining Work
VAC = Variance at Completion
Cost Management

Forecasting – EAC

- Using a new estimate
  \[ EAC = AC + ETC \]

- Using remaining budget
  \[ EAC = AC + (BAC - EV) \]

- Using CPI
  \[ EAC = AC + \left( \frac{BAC - EV}{CPI} \right) \]

- Using both CPI & SPI
  \[ EAC = AC + \left( \frac{BAC - EV}{CPI \times SPI} \right) \]
Cost Management
Forecasting – TCPI

- The calculated projection of cost performance that must be achieved on the remaining work to meet a specified management goal.

- Using BAC
  \[ TCPI = \frac{(BAC - EV)}{(BAC - AC)} \]

- Using EAC
  \[ TCPI = \frac{(BAC - EV)}{(EAC - AC)} \]

- VAC = BAC – EAC
Cost Management

Cost Management – Summary

- Three (3) processes
- Earned Value concepts & calculations
- Life cycle costing
- Cost baseline
- Estimating vs. budgeting
- Types of estimates & estimating
- Contingency and management reserve
Questions and Answers
Review Questions:

Earned Value Lab Quiz:

1. Which of the following variables represents the budgeted cost for the work scheduled to be completed up to a given point?
   A. Actual cost
   B. Planned value
   C. Earned value
   D. Estimate at completion

2. Which of the following variables represents the budgeted amount for the work completed on the scheduled activity up to a given point?
   A. Planned value
   B. Actual costs
   C. Estimate to completion
   D. Earned value

3. Which of the following variables represents the total cost incurred in accomplishing work on the scheduled activity during a specific time period?
   A. Actual costs
   B. Summary costs
   C. Earned value
   D. Planned value

4. Which of the following variables represents the amount of additional money that needs to be spent to complete the project?
   A. EAC
   B. ETC
   C. CPI
   D. SPI

5. Which of the following variables represents the total amount of money that is estimated to be spent when the project is completed?
   A. ETC
   B. CPI
   C. EAC
   D. SPI
6. Which of the following variables represents the formula: Earned Value minus Actual Costs?
   A. CV
   B. CPI
   C. SV
   D. SPI

7. Which of the following variables represents the formula: Earned Value minus Planned Value?
   A. SPI
   B. CV
   C. CPI
   D. SV

8. Which of the following variables represents the formula: Earned Value divided by Actual Costs?
   A. CV
   B. SPI
   C. SV
   D. CPI

9. Which of the following variables is represented by the formula: Earned Value divided by the Planned Value?
   A. SPI
   B. SV
   C. CPI
   D. CV

10. Which of the following is used to forecast project costs at completion?
    A. CPI
    B. SPI
    C. Cumulative CPI
    D. Cumulative SPI

11. Which of the following is used to display earned value data over time?
    A. A Gantt chart
    B. An S-curve
    C. An EV table
    D. A cost & schedule baseline chart
12. Your boss enters your office and asks for the cost variance on your project that has an AC of $225, a PV of $200, and an EV of $180. What value do you provide them?
   A. -45
   B. -20
   C. 0.80
   D. 0.90

13. Your boss enters your office and asks for the cost variance on your project that has an AC of $290, a PV of $300, and an EV of $270. What value do you provide them?
   A. -30
   B. 0.95
   C. 0.92
   D. -20

14. Your boss enters your office and asks for the cost variance on your project that has an AC of $45, a PV of $40, and an EV of $50. What value do you provide them?
   A. 10
   B. 5
   C. 1.11
   D. 1.25

15. Your boss enters your office and asks for the schedule variance on your project that has an AC of $45, a PV of $40, and an EV of $50. What value do you provide them?
   A. 10
   B. 5
   C. 1.11
   D. 1.25

16. Your boss enters your office and asks for the cost variance on your project that has an AC of $400, a PV of $405, and an EV of $391. What value do you provide them?
   A. -5
   B. 1.30
   C. 1.08
   D. -9
17. Your boss enters your office and asks for the cost variance on your project that has an AC of $42, a PV of $30, and an EV of $28. What value do you provide them?
   A. -2
   B. -14
   C. 0.67
   D. 0.93

18. You are preparing your monthly status report for your project. Your project had an original budget of U.S. $150,000 and an original schedule of 18 months. You currently have spent U.S. $65,000 and had budgeted to spend U.S. $60,000. You have produced U.S. $55,000 worth of product. Your Vice President is very eager to review your report as your project is important to the company’s success. What is the Cost?
   A. -10,000
   B. -5,000
   C. 0.85
   D. 0.92
Review Quiz:

1. Which of the following is last process in Cost Management?
   A. Estimate costs
   B. Determine budget
   C. Control costs
   D. Pay vendors

2. Which of the following is not a process in the cost management knowledge area?
   A. Estimate costs
   B. Estimate contracts
   C. Determine budget
   D. Control costs

3. Which of the following is the first process found in the cost management knowledge area?
   A. Plan cost management
   B. Determine budget
   C. Plan purchases & acquisitions
   D. Control costs

4. One way to compute EAC is to take the cumulative actual costs and:
   A. Add the BAC
   B. Add the Cumulative Earned Value
   C. Add the BAC - Cumulative Earned Value
   D. Divide by the CPI

5. One way to compute EAC is to take the cumulative actual costs and:
   A. Add a new estimate to complete divided by the CPI
   B. Add the cumulative remaining earned value
   C. Divide by the SPI
   D. Add Original Total Budget minus Cumulative Earned Value

6. One way to compute EAC is to take the cumulative actual costs and:
   A. Add (BAC - Cumulative EV)/CPI
   B. Add a new estimate to complete divided by the CPI
   C. Add the cumulative remaining earned value
   D. Divide by the CPI
7. Your boss comes into your office and asks how much more money it is going to take to complete your project. What do you provide them?
   A. The most current EAC
   B. The project budget plus a variance
   C. The most current ETC
   D. The worst case scenario value

8. You are six months into a year-long project when your boss comes into your office and asks how much money in total your project is going to cost at completion. What do you provide them?
   A. The most current ETC
   B. The most current EAC
   C. The project budget / CPI
   D. The project budget plus the latest variance estimate

9. One way to compute ETC is to:
   A. Create an entirely new estimate
   B. Take the BAC and add the cumulative EV
   C. Take the BAC / CPI
   D. Take the BAC and add an entirely new estimate

10. One way to compute ETC is to:
    A. Take the BAC plus the cumulative EV
    B. Take the EAC - BAC
    C. Take the EAC / CPI
    D. Take the BAC minus the cumulative EV

11. One way to compute ETC is to:
    A. Assume the variances are atypical and take the (BAC + EV) / CPI
    B. Assume the variances are typical and take the (BAC - cumulative EV) / CPI
    C. Make no assumptions about the variance and take the EAC - BAC
    D. Make no assumptions about the variance and take the EAC / CPI
12. Which of the following is primarily concerned with examining the value of the next highest alternative?
   A. Sunk costs
   B. Life cycle costs
   C. Opportunity cost
   D. Operational costs

13. At lunch one of your fellow project managers laments about the high sunk costs on their project that is impacting key decisions. What are they likely saying?
   A. Money budgeted to be spent is impacting the project
   B. The unseen costs of the project are impacting decisions
   C. Their project should be cancelled
   D. Money already spent on the project is impacting the decisions

14. Which of the following falls under a project manager's ethical responsibility?
   A. Opportunity costing
   B. Life cycle costing
   C. Sunk costing
   D. Project costing

15. Which of the following is not typically part of the cost management plan?
   A. Cost paradigms
   B. Control thresholds
   C. Earned value rules
   D. Reporting formats

16. Considering the effect project decisions have on the cost of using, maintaining, and supporting the product of the project is more commonly referred to as what?
   A. Project costing
   B. Ethical cost management
   C. Life cycle costing
   D. Professional cost responsibility

17. Life cycle costing is often combined with what to improve decision making, reduce cost and execution time, and to improve the quality of the project?
   A. Earned value management
   B. Opportunity costing
   C. Professional project management
   D. Value engineering
18. In which of the following processes is the project cost management plan developed?
   A. The plan cost management process
   B. The cost estimating process
   C. The cost budgeting process
   D. The cost control process

19. Which of the following is not an input to the estimate costs process?
   A. Human resource management plan
   B. Scope baseline
   C. Reserve analysis
   D. Enterprise environmental factors

20. Which of the following is not an input to the estimate costs process?
   A. Organizational process assets
   B. Resource cost rates
   C. Risk register
   D. Project schedule

21. Which of the following is an input to the estimate costs process?
   A. RBS
   B. Risk register
   C. Activity cost estimate
   D. Resource calendars

22. Which of the following is not a tool or technique used in the estimate costs process?
   A. Vendor bid analysis
   B. Reserve analysis
   C. Cost aggregation
   D. Cost of quality

23. Which of the following is not a tool or technique used in the estimate costs process?
   A. Funding limit reconciliation
   B. Expert judgment
   C. Cost of quality
   D. Project management estimating software
24. Which of the following is a tool or technique used in the estimate costs process?
   A. Cost aggregation
   B. Cost baselining
   C. Activity cost estimating
   D. Cost of quality

25. Which of the following is a tool or technique used in the estimate costs process?
   A. Vendor bid analysis
   B. Funding limit reconciliation
   C. Variance management
   D. Forecasting

26. Which of the following is an output to the estimate costs process?
   A. Cost baseline
   B. Project funding requirements
   C. Basis of estimates
   D. Performance measurements

27. Which of the following describes the difference between costing and pricing?
   A. Costing includes profit and pricing does not
   B. Pricing includes profit and costing does not
   C. Pricing always includes a factor of cost
   D. Cost is always a multiplier of price

28. Which of the following best represents a ROM estimate?
   A. +/-100%
   B. (100%) to +50%
   C. +/-25%
   D. +/-(50%)

29. Which of the following ranges best represents a definitive estimate?
   A. +/-10%
   B. +/-15%
   C. +/-25%
   D. +/-5%
30. A coworker comes into your office and asks about your project that is currently in the execution phase. They specifically want to know what the budget for your project is. If your team estimated the project at US $275,000 what do you tell your coworker?
   A. Approximately $302,500
   B. $247,500 to $316,250
   C. $247,500 to $302,500
   D. Approximately $316,250

31. Your manager comes into your office and asks about your project that is currently in the initiating phase. They specifically want to know what the budget for your project is. If your team estimated the project at US $500,000 what do you tell your boss?
   A. Approximately $1,000,000
   B. $250,000 to $750,000
   C. $500,000 plus or minus 50%
   D. $500,000 to $2,000,000

32. Your manager comes into your office and asks about your project that is currently in the execution phase. They specifically want to know what the budget for your project is. If your team estimated the project at US $250,000 what do you tell your boss?
   A. $225,000 to $275,000
   B. $237,500 to $275,000
   C. $125,000 to $500,000
   D. Approximately $275,000

33. Which of the following is a formally recognized enterprise environmental factor that is an input to the cost estimating process?
   A. Cost estimating policies
   B. Historical information
   C. Lessons learned
   D. Published commercial information

34. Which of the following is not a formally recognized organizational process asset used in the cost estimating process?
   A. Cost estimating policies
   B. Commercial databases
   C. Historical information
   D. Lessons learned
35. Which of the following cost estimating techniques involves using the actual costs from previous, similar projects as its basis?
   A. Bottom-up estimating
   B. Parametric estimating
   C. Analogous estimating
   D. Monte Carlo estimating

36. Which of the following cost estimating techniques involves calculating the costs of individual tasks or activities and then summarizing the costs?
   A. Analogous estimating
   B. Bottom-up estimating
   C. Parametric estimating
   D. Monte Carlo estimating

37. Which of the following cost estimating techniques involves calculating the costs of individual tasks or activities or work packages by determining the relationship between them, historical data and other variables?
   A. Parametric estimating
   B. Bottom-up estimating
   C. Analogous estimating
   D. Monte Carlo estimating

38. Reserve analysis is the process of looking at the estimated costs to deal with what?
   A. Unknown unknowns
   B. Certain events
   C. None of the above
   D. Known unknowns

39. If your original estimate was 38 weeks and you provided your sponsor with an estimate of 34 to 42 weeks what kind of estimate did you provide?
   A. Rough order of magnitude estimate
   B. Final estimate
   C. Budget estimate
   D. Definitive estimate
40. If you have a burn rate of .92 which of the following is true?
   A. The AC is 110 and the EV is 120
   B. The AC is 120 and the EV is 110
   C. The AC is 120 and the PV is 110
   D. The EV is 110 and the PV is 120

41. If you have a burn rate of 1.21 which of the following is true?
   A. The AC is U.S. $84,000 and the EV is U.S. $102,000
   B. The AC is U.S. $102,000 and the EV is U.S. $84,000
   C. The AC is U.S. $84,000 and the PV is U.S. $102,000
   D. The EV is U.S. $102,000 and the PV is $84,000

42. Your manager comes into your office to discuss a project you are leading. In your latest status report you indicated a burn rate of 0.86. If you have spent U.S. $192,000 what else do you know to be true?
   A. You had budgeted to spend U.S. $165,000
   B. Your SPI is 0.86
   C. You have produced U.S. $165,000 of work
   D. Your cost variance is less than your schedule variance

43. You have been assigned a project to deploy new desktop computers throughout your organization. Your assignment to the project has occurred after the project estimates have been completed and baselines have been established. You are concerned that the cost estimates are unrealistic based upon your previous experience. Which of the following is the best thing to do?
   A. Determine if the contingency budget will cover the additional costs
   B. Bring your project team together to determine the best solution
   C. Meet with the project sponsor to examine possible solutions
   D. Meet with the people who generated the cost estimate

44. You are the project manager on a large road project that has a current cost variance of U.S. $176,000. What does this mean?
   A. The project is U.S. $176,000 over budget
   B. The project is U.S. $176,000 ahead of schedule
   C. The project is U.S. $176,000 behind schedule
   D. The project is U.S. $176,000 under budget
45. Your project currently has a SV of U.S. $-71,000. What does this mean?
   A. The project is U.S. $71,000 under budget
   B. The project is U.S. $71,000 behind schedule
   C. The project is U.S. $71,000 over budget
   D. The project is U.S. $71,000 ahead of schedule

46. You are leading a multi-year project that is making use of resources in four (4) different locations. Management has mandated that you use Earned Value Analysis. If the project is a software development project which of the following would not be necessary to determine the initial cost baseline?
   A. WBS
   B. Network diagram
   C. Scope change management plan
   D. Risk register

47. You are the project manager for a major road project. You have been asked to estimate the cost for your project using the formula of number of miles of road multiplied by the number of lanes multiplied by the cost per lane mile of road. What kind of estimate is this?
   A. Parametric estimate
   B. Analogous estimate
   C. Rough order of magnitude estimate
   D. Bottom up estimate

48. In which of the project management process groups would you make a ROM estimate?
   A. The planning process group
   B. The executing process group
   C. The monitoring and controlling process group
   D. The initiating process group

49. You have been asked to choose between two different projects that your organization might undertake. Which of the following would not be grounds for comparison?
   A. BCR
   B. Marginal analysis
   C. IRR
   D. NPV
50. Which of the following is a tool for determining when investing any additional money will not produce an equivalent return?
   A. Marginal analysis
   B. Benefit cost ratio analysis
   C. Cost benefit ratio analysis
   D. Internal rate of return analysis

51. You have been asked to choose one of three projects. Project A has an NPV of U.S. $75,000. Project B has an NPV of U.S. $81,000. And Project C has an NPV of U.S. $62,500. What is the opportunity cost of selecting Project B?
   A. U.S. $81,000
   B. U.S. $62,500
   C. U.S. $75,000
   D. U.S. $6,000

52. You have been asked to choose one of three projects. Project A has an NPV of U.S. $27,000. Project B has an NPV of U.S. $41,000. And Project C has an NPV of U.S. $36,000. What is the opportunity cost of selecting Project B?
   A. U.S. $41,000
   B. U.S. $36,000
   C. U.S. $27,000
   D. U.S. $5,000

53. You have been asked to choose one of three projects. Project A has an NPV of U.S. $17,000. Project B has an NPV of U.S. $32,000. And Project C has an NPV of U.S. $39,000. What is the opportunity cost of selecting Project B?
   A. U.S. $39,000
   B. U.S. $32,000
   C. U.S. $17,000
   D. U.S. $7,000

54. You are placed in charge of a software development project. As part of your team building you determine that your resources do not have all the necessary skills. To improve their skills you decide to send them to an external class to obtain the required skills. Which of the following would best categorize this expense?
   A. Indirect cost
   B. External cost
   C. Fixed Cost
   D. Direct cost
55. You are meeting with the project sponsor. They voice concerns about the setup costs of the project escalating. You assure them that this is not an issue. Why?
   A. Because good project management will ensure the costs do not escalate
   B. Because project setup represents an opportunity cost
   C. Because project setup represents an overhead cost
   D. Because project setup represents a fixed cost

56. You have been asked to determine a less costly way to complete the same work. Which of the following tools would you use?
   A. Value analysis
   B. Six sigma analysis
   C. Marginal analysis
   D. Benefit cost analysis

57. When working with earned value management which primary term represents the actual output or work product?
   A. Planned value
   B. Earned value
   C. Actual cost
   D. CPI

58. When working with earned value management which primary term represents the project budget?
   A. Planned value
   B. Earned value
   C. Actual cost
   D. CPI

59. You have been asked to select one of three projects for your organization using NPV. Project 1 has an NPV of U.S. $49,000 and will take three (3) years to produce. Project 2 has an NPV of U.S. $61,000 and will take five (5) years to produce, and Project 3 has an NPV of U.S. $37,000 and will take two (2) years to produce. Which project would you select?
   A. Project 1
   B. Project 2
   C. Project 3
   D. It cannot be determined
Answer Key:

Earned Value Lab Answers:

1. B
   PMBOK Guide - The Planned Value is the budgeted cost for the work scheduled to be completed on an activity or WBS component up to a given point. This is sometimes referred to as the BCWS.

2. D
   PMBOK Guide - The Earned Value is the budgeted amount for the work actually completed on the scheduled activity during a specified time period. This is sometimes referred to as the BCWP.

3. A
   PMBOK Guide - The Actual Costs are the total costs incurred in accomplishing work on the scheduled activity during a specified time period. The actual costs are sometimes referred to as ACWP, or actual costs of work performed.

4. B
   PMBOK Guide - The estimate to complete provides a metric showing how much more money than has already been spent is needed to complete the project. This is in addition to the money that has already been spent. The ETC is correct.

5. C
   PMBOK Guide - As a project continues it is important that you are constantly revising your estimates of how much money you are going to have to spend. This total number is represented by the Estimate At Completion, or EAC.

6. A
   PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.

7. D
   PMBOK Guide - The Schedule Variance, or SV, represents an indicator of how far off of the original schedule baseline the project actually is. To calculate the SV, take the Earned Value and subtract the Planned Value. A project is on schedule if the SV is equal to 0.
8. D
PMBOK Guide - The Cost Performance Index, or CPI, represents how far away from the original cost baseline the project is using a percentage indicator (the number 1). To calculate the CPI, take the Earned Value and divide it by the project’s actual costs to date.

9. A
PMBOK Guide - The Schedule Performance Index, or SPI, represents how far off the original schedule baseline the project is using a percentage indicator (the number 1). To calculate the SPI, take the Earned Value and divide it by the project’s planned value.

10. C
PMBOK Guide - The cumulative CPI is used to forecast project costs at completion. Using the CPI gives only the value for that period and would not provide an accurate forecast.

11. B
PMBOK Guide - An S-curve that displays the EV, AC and PV over time is the most common visual representation of earned value data.

12. A
PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.

13. D
PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.

14. B
PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.
15. A
PMBOK Guide - The Schedule Variance, or SV, represents an indicator of how far away from the original schedule baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the Planned Value (PV). A project is on target if the SV is equal to 0.

16. D
PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.

17. B
PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.

18. A
PMBOK Guide - The Cost Variance, or CV, represents an indicator of how far away from the original cost baseline the project actually is. To calculate it, take the Earned Value (EV) and subtract the actual costs. A project is on target if the CV is equal to 0.
Review Quiz Answers:

1. C
   PMBOK Guide - Plan cost management, estimate costs, determine budget and control costs are all part of Cost Management. Control costs is last.

2. B
   PMBOK Guide - Estimate contracts is a made up process.

3. A
   PMBOK Guide - The first process found in the Cost Management knowledge area is plan cost management.

4. C
   PMBOK Guide - There are several ways to calculate the Estimate At Completion or EAC. The most common of these include:
   - Creating an entirely new estimate
   - Cumulative actual costs + Original Total Budget - Cumulative Earned Value
   - Cumulative Actual Costs + ((Original Total Budget - Cumulative Earned Value) / Cumulative CPI)
   - Original Total Budget / CPI

5. D
   PMBOK Guide - There are several ways to calculate the Estimate At Completion or EAC. The most common of these include:
   - Creating an entirely new estimate
   - Cumulative actual costs + Original Total Budget - Cumulative Earned Value
   - Cumulative Actual Costs + ((Original Total Budget - Cumulative Earned Value) / Cumulative CPI)
   - Original Total Budget / CPI

6. A
   PMBOK Guide - There are several ways to calculate the Estimate At Completion or EAC. The most common of these include:
   - Creating an entirely new estimate
   - Cumulative actual costs + Original Total Budget - Cumulative Earned Value
   - Cumulative Actual Costs + ((Original Total Budget - Cumulative Earned Value) / Cumulative CPI)
   - Original Total Budget / CPI
7. C
PMBOK Guide - This question is asking how much more money is required. This is money in addition to the money already spent. This is the definition of the Estimate to Complete or ETC.

8. B
PMBOK Guide - This question is asking how much money will you have spent when the project has been completed. This is the Estimate at Completion or EAC.

9. A
PMBOK Guide - There are three ways to calculate ETC or Estimate to Complete. They include:
- Create an entirely new estimate
- Assume the variances are atypical (BAC- Cumulative EV)
- Assume the variances are typical (BAC - cumulative EV) / CPI

10. D
PMBOK Guide - There are three ways to calculate ETC or Estimate to Complete. They include:
- Create an entirely new estimate
- Assume the variances are atypical (BAC- Cumulative EV)
- Assume the variances are typical (BAC - cumulative EV) / CPI

11. B
PMBOK Guide - There are three ways to calculate ETC or Estimate to Complete. They include:
- Create an entirely new estimate
- Assume the variances are atypical (BAC- Cumulative EV)
- Assume the variances are typical (BAC - cumulative EV) / CPI

12. C
Opportunity costs measure the value of the next highest alternative. This provides a way of measuring what you chose not to do.

13. D
Sunk costs represent money that has already been spent on the project. Often these costs become so great that projects are forcibly continued to save face or for other reasons when they should be cancelled.
14. B
Although project costing is a responsibility of the project manager, life cycle costing is an ethical responsibility. The project manager has the responsibility to ensure the product of the project is within the operating budget of the organization.

15. A
Control thresholds, earned value rules and reporting formats are all typically part of the cost management plan. "Cost paradigms" is a non-existent term for the purposes of project management.

16. C
Project cost management should consider the effect of project decisions on the cost of using, maintaining, and supporting the project's product or service is more commonly referred to as life cycle costing.

17. D
Life cycle costing is often combined with value engineering to improve decision making, reduce costs and execution time, and to improve the quality of the project.

18. A
PMBOK Guide - the PMBOK Guide specifies that the cost management plan is initially produced as part of the plan cost management process which is the first process found in the cost management knowledge area.

19. C
PMBOK Guide - The inputs for the estimate costs process include:
-Cost management plan
-Human resource management plan
-Scope baseline
-Project schedule
-Risk register
-Enterprise environmental factors
-Organizational process assets
20.B
PMBOK Guide - The inputs for the estimate costs process include:
- Cost management plan
- Human resource management plan
- Scope baseline
- Project schedule
- Risk register
- Enterprise environmental factors
- Organizational process assets

21.B
PMBOK Guide - The inputs for the estimate costs process include:
- Cost management plan
- Human resource management plan
- Scope baseline
- Project schedule
- Risk register
- Enterprise environmental factors
- Organizational process assets

22.C
PMBOK Guide - The tools and techniques for cost estimating include:
- Expert judgment
- Analogous estimating
- Parametric estimating
- Bottom-up estimating
- Three-point estimates
- Reserve analysis
- Cost of quality
- Project management estimating software
- Vendor bid analysis
- Group decision-making techniques
23.A
PMBOK Guide - The tools and techniques for cost estimating include:
- Expert judgment
- Analogous estimating
- Parametric estimating
- Bottom-up estimating
- Three-point estimates
- Reserve analysis
- Cost of quality
- Project management estimating software
- Vendor bid analysis
- Group decision-making techniques

24.D
PMBOK Guide - The tools and techniques for cost estimating include:
- Expert judgment
- Analogous estimating
- Parametric estimating
- Bottom-up estimating
- Three-point estimates
- Reserve analysis
- Cost of quality
- Project management estimating software
- Vendor bid analysis
- Group decision-making techniques

25.A
PMBOK Guide - The tools and techniques for cost estimating include:
- Expert judgment
- Analogous estimating
- Parametric estimating
- Bottom-up estimating
- Three-point estimates
- Reserve analysis
- Cost of quality
- Project management estimating software
- Vendor bid analysis
- Group decision-making techniques
26. C
  PMBOK Guide - The outputs for the estimate costs process include:
  - Activity cost estimates
  - Project documents updates

27. B
  Price is made up of the cost of the item plus the desired profit. Cost simply
  represents what the item took to produce in monetary terms.

28. D
  PMBOK Guide - Early in a project's life cycle you are not likely to have a lot of
  detailed information. Therefore, you need to provide a wide ranging estimate.
  The Rough Order of Magnitude estimate does just that. It is a range of +/-50% of
  the original estimate.

29. A
  The definitive estimate is the final project estimate given to all management and
  resources. It is never a single number and always represented by a range. The
  correct range for a definitive estimate is +/-10%.

30. C
  Remember, according to PMI, you never give a single number. You always
  provide a range. In this case that fact excludes two of the answers. Since you
  are in the execution phase of the project you are using the definitive estimate
  which is +/- 10%. That provides a range of $247,500 to $302,500.

31. B
  Remember, according to PMI, you never give a single number. You always
  provide a range. In this case that fact excludes two of the answers. Since you
  are in the initiation phase of the project you are using the ROM estimate which is
  +/-50%. That provides a range of $250,000 to $750,000.

32. A
  Remember, according to PMI, you never give a single number. You always
  provide a range. In this case that fact excludes one of the answers. Since you
  are in the planning phase of the project you are using the budget estimate which
  is +/-10%. That provides a range of $225,000 to $275,000.
33. D
PMBOK Guide - Enterprise environmental factors are factors or conditions that exist within the area that the project resides. When discussing the factors for the cost estimating process PMI specifically calls out two:
- Marketplace conditions
- Published commercial information

34. B
PMBOK Guide - Organizational process assets represent templates and information that help the project team complete the project. When it comes to the cost estimating process these assets formally include:
- Cost estimating policies
- Cost estimating templates
- Historical information
- Lessons learned

35. C
PMBOK Guide - Analogous estimating represents a technique used usually early in a project to develop cost and schedule estimates. It makes use of comparative analysis and argues that if two projects are similar their costs should be similar as well. This method runs a significant accuracy risk because often the details of the projects are not that similar.

36. B
PMBOK Guide - Bottom up estimating involves completing the estimates at the lowest possible level, the task or activity, and then summing the work packages as you go higher up the WBS. PMI considers this the most accurate and detailed form of estimating.

37. A
PMBOK Guide - Parametric estimating is a technique that uses a statistical relationship between historical data and other variables to calculate a cost estimate.

38. D
PMBOK Guide - Reserve analysis is the technique of looking for areas where there are known, potential risks, called known unknowns because you know they are possible, but you do not know when they are going to happen.
39. D
   The definitive estimate is the final estimate provided in the project. It is the estimate used for baselines and represents a range of +/-10%.

40. B
   The "Burn Rate" measures the rate you are "burning" or spending your money versus how much work product you are obtaining. It is another way to say CPI. It is expressed as a numerical value with a target of one. It is defined by the formula of Earned Value / Actual Costs.

41. A
   The "Burn Rate" measures the rate you are "burning" or spending your money versus how much work product you are obtaining. It is another way to say CPI. It is expressed as a numerical value with a target of one. It is defined by the formula of Earned Value / Actual Costs.

42. C
   The "Burn Rate" measures the rate you are "burning" or spending your money versus how much work product you are obtaining. It is another way to say CPI. It is expressed as a numerical value with a target of one. It is defined by the formula of Earned Value / Actual Costs.

43. B
   Your best answer is to always work with your project team first to determine alternatives. Remember, the PMI standards are all about examining alternatives and presenting recommendations. You would not want to meet with anyone else until you have met with your team.

44. D
   The cost variance, or CV is calculated using the formula Earned Value - Actual Cost. A project with a negative value is over budget and a project with a positive value is currently under budget.

45. B
   The Schedule Variance, or SV, is calculated using the formula Earned Value - Planned Value. A project with a negative SV is behind schedule and a project with a positive SV is ahead of schedule.
46. C
PMBOK Guide - The cost performance baseline is an output of the determine budget process. In order to determine which it is you would need the WBS to see all the deliverables of the project, a network diagram to see the dependencies between deliverables and the listing of potential risks to establish any contingency. However, you would not need you scope change management plan to determine the cost baseline.

47. A
PMBOK Guide - Parametric estimating is a technique that uses a statistical relationship between historical data and other variables to calculate a cost estimate. In other words a mathematical model.

48. D
PMBOK Guide - A Rough Order of Magnitude estimate or ROM, is done in the initiating phases of the project. This estimate has a range of +/-50% the widest variance, and is therefore used as the earliest estimate in the project.

49. B
Marginal analysis, which uses the law of diminishing returns is an attempt to find the point investing $1 gets you exactly $1 in return and investing any more give you less. In those situations, it usually does not make sense to invest more. This is an important measure, but does not help you compare projects. The Benefit/Cost Ratio, Internal Rate of Return and Net Present Value all can help compare projects.

50. A
Marginal analysis, which uses the law of diminishing returns is an attempt to find the point investing $1 gets you exactly $1 in return and investing any more give you less. In those situations, it usually does not make sense to invest more.

51. C
Opportunity cost is defined as the value of the next highest, not selected alternative. In this case, the correct answer is U.S. $75,000.

52. B
Opportunity cost is defined as the value of the next highest, not selected alternative. In this case, the correct answer is U.S. $36,000.
53. A
Opportunity cost is defined as the value of the next highest, not selected alternative. In this case, the correct answer is U.S. $39,000.

54. D
In this case the training is directly related to the project and is therefore a direct cost of the project.

55. D
The setup of a project does not have a direct tie to the amount or number of products produced. It is generally done before any production occurs and therefore is a fixed cost.

56. A
This is a simple memorization question. You must remember that value analysis is all about determining the least costly way to complete work (e.g. obtain the most value).

57. B
There are three (3) key variables to establish the earned value calculations:
- Earned value - the work product
- Planned value - the budget
- Actual costs - how much you really spent

58. A
There are three (3) key variables to establish the earned value calculations:
- Earned value - the work product
- Planned value - the budget
- Actual costs - how much you really spent

59. B
This is a trick question of sorts. The question provides both the term of the project and the NPV. This would seem to indicate that you must do something with the term. However, the NPV takes into account the project term making this information unnecessary. All you have to do is select the largest value.