



# PMP® Exam Prep

(What it really takes to prepare and pass)

An eBook by Project Road Training, LLC

[www.project-road.com](http://www.project-road.com)

**Bill Baxter**

Version 6-2

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# Welcome to the eBook by Project Road Training

(A well-travelled road to PMP® exam success)

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The purpose of this ebook is to provide you with wise guidance – to help you prepare for the PMP® exam as efficiently as possible.

This wisdom is based upon the experienced I've gained working eye ball to eye ball with hundreds of students as they prepare for the exam, as well as my own PMP® exam experience.

How should you approach your studies? You will find a proven path within. Incisive instruction in schedule network diagrams and earned value management – areas where people need help up the early part of the learning curve – is provided here.

Every point within this document has been refined and validated through feedback pried from my PMP® candidates. I thank them for their trust in my direction – as well as their efforts and successes.

To help ensure success with your certification exam, follow me closely, along Project Road.

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# Outline

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4. *PMBOK® Guide* – Structure & Study Strategy
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6. Practice Questions vs. Practice Tests
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8. Project Schedule Network Diagrams
9. Cost Control / Earned Value Management / Present Value Calculations
10. Suggested Brain Dump - Pages 1 & 2



# 1. Introduction

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- ♦ Author: Bill Baxter, PMP

- E-mail: [bill@project-road.com](mailto:bill@project-road.com)
- Occupation: Instructor, teaching PMP Exam Prep
- Background: MBA, Finance & Accounting (Columbia University)
  - BS, Mechanical Engineering (Stanford University)
  - Experience: engineering in the aerospace industry, followed by various roles in the IT industry



- ♦ My goal: set you on the road to preparing for your PMP® exam with confidence, optimizing your efforts

- ♦ About Project Road Training, LLC

- Born out of a study group formed-up to prepare for the PMP® exam
- I saw how my study group struggled to see a clear path toward passing the PMP® exam and realized there was a need for a clear, concise guide
- I decided I was going to meet that need. In the process I rediscovered how much I love teaching
  - For additional information see [www.project-road.com](http://www.project-road.com)



## 2. Application Process, PMP® Exam – Jumping Through Hoops

### ◆ Eligibility Requirements

- Detailed on the PMI.org website
- Hours of Project Experience:
  - 4,500 to 7,500, depending upon Education
- 35 hours of *qualified* Project Training
  - Web-based training can satisfy at low cost
  - See [www.project-road.com](http://www.project-road.com)
- (CAPM® requires no project experience - just a high school diploma and 23 hours project training)



### ◆ List out your project experience early-on

- First step in completing your application to take the exam
- Format: Project name; start & end dates; Hours; Manager or other Reference
- If possible, minimize number of contacts listed, in case you get audited
  - Much easier to get all the verifications you need if only a few contacts involved

### ◆ Develop study plan and set test date. Get your application process completed

- Schedule your test date a month in advance for scheduling flexibility
  - Form a study group and make attendance a priority – reinforces motivation



### 3. PMP® Certification Test – Structure & Test Environment

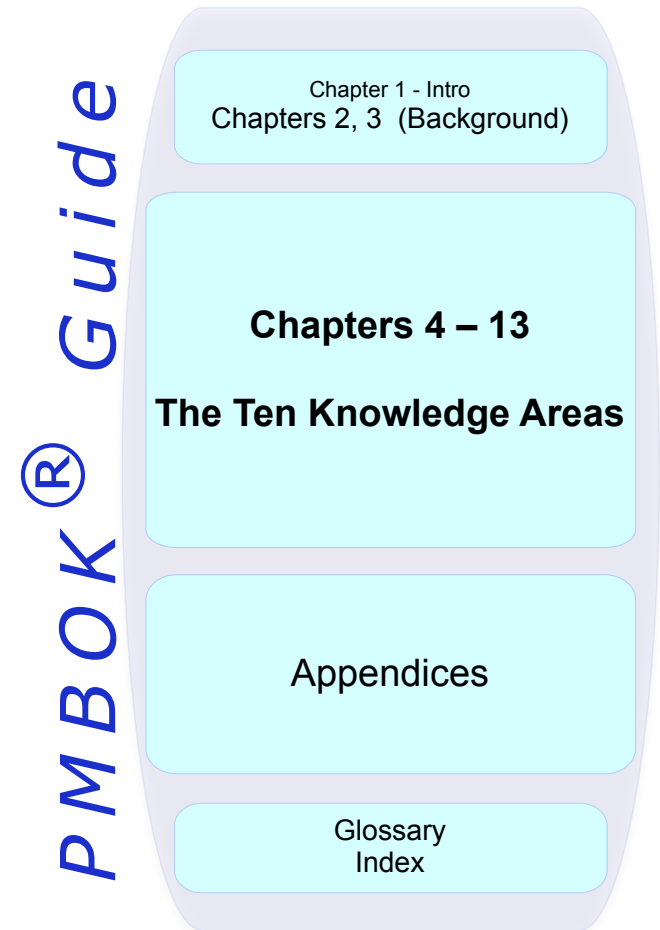
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- ♦ Info is on PMI.org web site
- ♦ Test Format
  - 200 questions in 4 hours
  - 1.2 minutes per question
  - Multiple Choice (four choices)
  - No penalty for wrong choices
- ♦ What To Expect On The Exam :
  - Some 'pure' of ITTO-type questions
  - Some frustratingly vague questions
  - Significant number of situational-type questions; expect some ethics questions
  - Many 'Dense' questions, where you need to read the question and the answer choices very carefully to understand what is really being asked — becomes a difficult reasoning challenge
  - Some EVM questions ( a few or a lot, depending on luck of the draw)
  - Schedule network diagrams likely to be quite simple or pre-drawn for you



## 4.1 PMBOK® Guide – Structure

- ♦ The *PMBOK® Guide* is at 6th Edition
  - True for those testing after March 26, 2018
  - A password-protected PDF file of the *PMBOK® Guide* is made available to you as you become a PMI member
  - The *PMBOK® Guide* has 13 chapters; Appendices
  - There is a glossary and then an Index at back
- ♦ Chapters 1 to 3 provide background
- ♦ Chapters 4 to 13 correspond to the ten “Knowledge Areas”
- ♦ On PMI.org, find the document called: “Code of Ethics and Professional Conduct”



PMI.org  
Web Site

Code of Ethics and  
Professional Conduct



## 4.2 *PMBOK® Guide* – Suggested Study Strategy

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- ♦ The *PMBOK® Guide* is hard to read
  - It will feel tedious to read
  - You will need a strategy to circle around it and wrestle it into control
  - Following is a strategy that works
  
- ♦ First Pass, for each topic do this (~ 2 chapters/week, 6 weeks in total)
  - Skim through the chapter in *PMBOK® Guide* (light, quick skim)
  - Watch the video lecture segments for the topic within my eLearning course
  - Read the corresponding chapter within the Crosswind study guide (next slide)
  - Do practice questions within my eLearning course
  - Go through the whole framework this way, chapter by chapter, building a solid foundation
  - Work on your brain dump, flashcards and ITTOs in parallel with all of this
  
- ♦ Second Pass, for each topic do this (~ 2 chapters/week, 6 weeks in total)
  - Do a deep read of the chapter in the *PMBOK® Guide*
  - Read past the stuff you already know — read for the other, subtle stuff that you need to absorb and retain on a best effort basis
  - Do practice questions within the Crosswind study guide
  - Keep working on your brain dump, flashcards and ITTOs in parallel with all of this





## 5.1 Other Materials To Study In Addition To *PMBOK® Guide*

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- ♦ Supplement the *PMBOK® Guide* with a study guide
  - The study guide I recommend (strongly) is the Crosswind book “PMP Exam Success Series: Bootcamp Manual” by Tony Johnson
    - After that first, relaxed read through the *PMBOK® Guide*, study chapters 1 through 14 in the Crosswind study guide. You’ll find the material much easier to absorb from the study guide. Covering one or two chapters per week is a good pace for most people.
    - The end of chapter practice questions for each chapter are especially valuable
- ♦ Broader scope of material in the study guide than in the *PMBOK® Guide*
  - Choosing a good study guide is so important. It is needed for clarification of material in the *PMBOK® Guide* - and to identify the ‘extra’ material you need to know
  - Certain topics in the Crosswind study guide warrant particular focus, as they cover important material that is not covered in the *PMBOK® Guide*
    - Standard deviation (Sigma), Chapter 8 - Quality
    - Organizational Theory, Chapter 9 - Resources
    - Point of Total Assumption, Chapter 12 - Procurement
- ♦ See [www.project-road.com](http://www.project-road.com) for additional study recommendations



## 5.2 Study Group Management

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- ◆ Being part of a weekly study group is fun and beneficial
  - Provides support and motivation - really valuable in keeping you focused over the three month period it takes most people to prepare for the PMP exam
- ◆ Have your study group agree on a study guide
- ◆ Have everyone bring their own study guide to study sessions
  - Try hard to attend in person
  - Do as many practice questions as possible each session, from the end-of chapter questions in the study guide
  - Have everyone read each question to themselves, quietly, and then write down an answer (A, B, C, or D)
  - Once everyone has an answer written down, go around the room and hear each answer, then check the book for the right answer, then discuss as needed. Then move on to the next question. Do just one question at a time. Take a few minutes to dig into the details when you uncover something that you don't know as well as you should
- ◆ Run your study group as a tight ship
  - Have some ground rules and enforce them, avoiding excessive time-wasting chit-chat
  - Agree on date and agenda for next study session, at the end of each session
  - Have a chat channel of some sort for communication between study sessions



## 6. Practice Questions vs. Practice Tests

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- ♦ Doing lots of Practice questions is a great way to learn
  - Of the leading study guides, practice questions in the Crosswind study guide seem best to me, and most representative of what you can expect to see on the exam
  - You will see a few questions that don't make sense, or where the answer seems wrong. That may be the case! Don't dwell on these too long. Move on.
- ♦ Don't start taking practice tests too soon
  - Practice questions are part of studying, to prepare for the exam
  - Practice tests are for assessment - to see if you are almost ready to take the test, and to identify remaining gaps
  - The questions at the end of each chapter in Crosswind are in a section called "practice tests". That's OK - so long as you do the questions one at a time and get immediate feedback after answering each question, you are using them as practice questions
  - Doing lots of practice questions is a key part of preparing for the exam
- ♦ You are not just testing comprehension of the material
  - There is a second challenge: learning to correctly parse the answer choices and get to the 'best' answer choice
  - There are some principles you need to learn to get to the best answer choice. Using good practice questions is critical for this. Crosswinds are good and mine are good. I have seen very few others that I would recommend.



## 7. Exam-Taking Strategy and the 'Brain Dump'

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- ◆ You're given 15 minutes at beginning to take tutorial on computer interface
  - According to PMI you are not allowed to begin writing your brain dump during this period, but must wait until your 4-hour test clock has begun.
  - Write out your two-page brain dump before you start working on the test questions. Practice until you can write it out in no more than 20 minutes. You don't want to eat into your test time by too much.
- ◆ Refer to your brain dump, as needed, during the test
- ◆ When you come across a question that will clearly take much longer to answer than average, 'mark' it and save it for a second pass through the test
  - Do this selectively – should only be about twenty or thirty questions like this
- ◆ The test interface provides a way to 'mark' a question for review
  - Use this feature to mark questions you want to come back and review further
  - Mark questions where you feel uncertain about your answer, but select your best answer during your first pass through the test whenever possible
  - Use all four hours to check your answers and make sure you score as high as possible
    - Leave no questions blank, in the end



## 8.1 Deep Dives into Schedule & Cost - Our Road Gets Steeper

Schedule Network Diagrams and Earned Value Management Calculations are two areas where I see people struggle

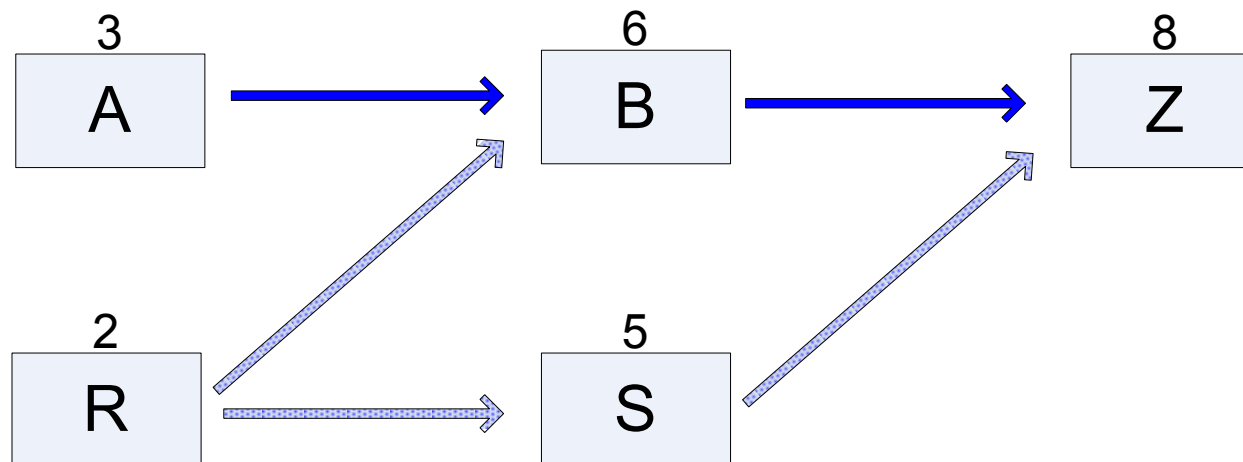
Next, we'll do deep dives into these two topics and give you a boost up the learning curve

- ◆ We're next going to cover some of the more challenging topics
- ◆ The road is about to get a little steeper...

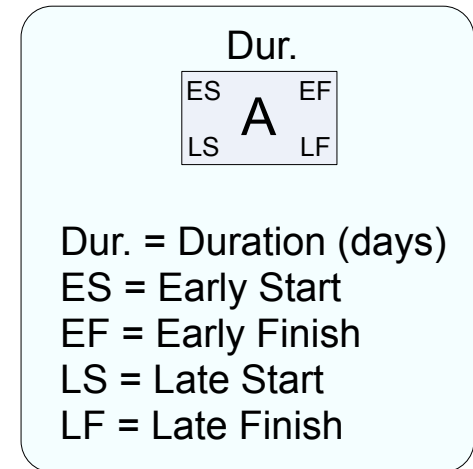
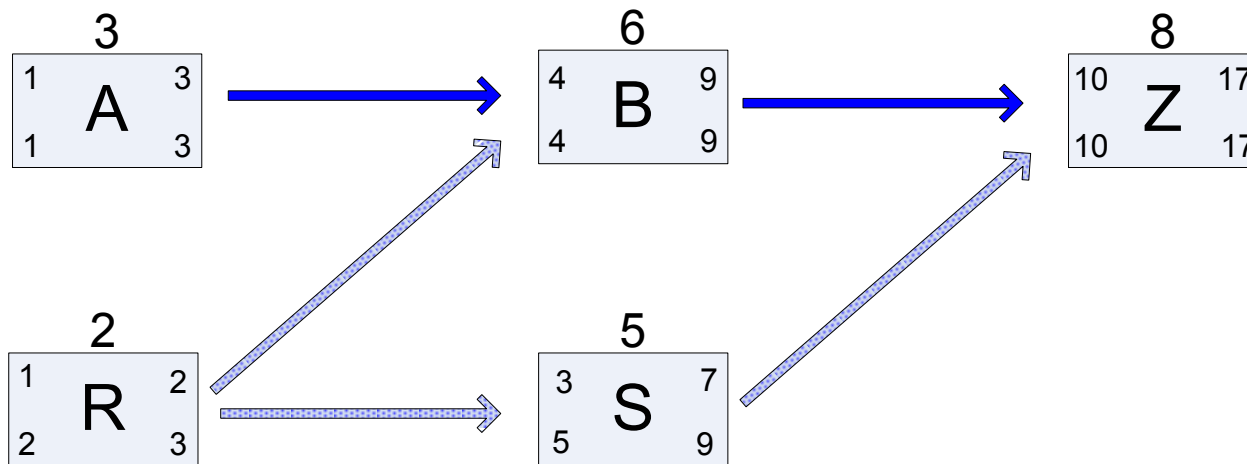


## 8.2 Project Schedule – Network Diagrams

- ♦ *PMBOK® Guide* Chapter 6 (Time Mgmt) is heavily dependent upon these diagrams
  - Knowing how to draw them and how to work with them is critical to doing well on the exam
- ♦ Simple Example
  - Task A requires three days to complete
  - Task R requires 2 days to complete
  - Task B must follow tasks A and R and requires 6 days to complete
  - Task S must follow task R and requires 5 days to complete
  - Task Z must follow tasks B and S and requires 8 days to complete
  - Determine early and late start and finish dates and slack in each task



## 8.3 Example Network Diagram, Cont'd



- ◆ Tasks A, B, Z on critical path and have zero float
- ◆ Task R has 1 day total Float ( $LF - EF = 1$ )
  - zero free float (a delay would delay task S)
- ◆ Task S has 2 days total float ( $LF - EF = 2$ )
  - 2 days free float (can delay 2 days without impacting task Z)

## 9.1 Cost – Earned Value Management (EVM)

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- ◆ EVM, in Chapter 7 – Cost Management, is a key part of The *PMBOK® Guide*
- ◆ EVM is an approach to measuring and tracking project scope, schedule and cost performance against plan over the life of the project
- ◆ EVM is used extensively in many government-sponsored projects
  - Especially U.S. federal government projects
  - And hence by large contractors who do lots of government business
- ◆ How EVM works (high-level view):
  - Decompose the project work into activities
  - Estimate costs and bundle-up into 'Work Break-down Structure' (WBS) units
  - The estimated cost of each WBS unit is the 'Planned Value' of that WBS unit
  - Once the work is completed on that WBS unit, all of that 'Planned Value' (PV) has been converted to 'Earned Value' (EV), while 'Actual Cost' (AC) is incurred over time.
    - EV is a measure of what you have accomplished. If EV is less than the PV at a given point in time, it means that you are behind schedule (you've accomplished less than planned)
    - EVM is the tracking of that conversion from Planned Value to Earned Value, and the examination of how the EV compares to both PV and to AC, at any given point in time





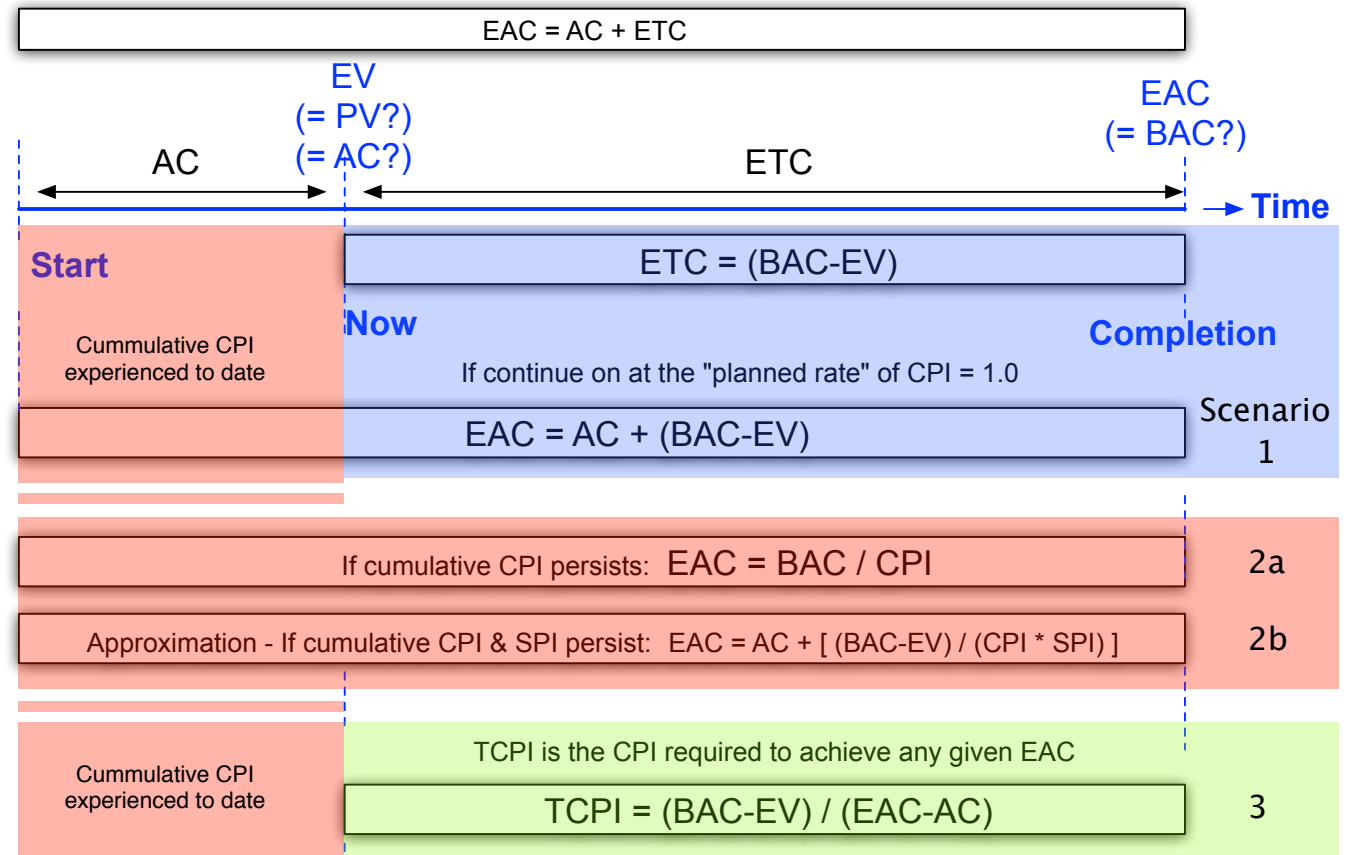
## 9.2.1 EVM -- The Important Equations - with some Context

**EVM, Earned Value Management: PV becomes EV as AC incurred over time**

**Concept:**  $\text{Sum WBS}_i = \text{Sum PV}_i = \text{'Performance Management Baseline'} = \text{BAC (Budget @ Completion)}$

ETC: Estimate to Complete  
 EAC: Estimate at Completion  
 BAC: Budget At Completion  
 $\text{EV}_i = \text{PV}_i * \% \text{ Complete (UOS)}$

SPI = Schedule Perf. Index  
 SV = Schedule Variance  
 CPI = Cost Performance Index  
 CV = Cost Variance  
 VAC = Variance at Completion  
 TCPI = To Complete Perf. Index



$\text{SPI} = \text{EV} / \text{PV} \sim \text{SV} = \text{EV} - \text{PV}$   
 $\text{CPI} = \text{EV} / \text{AC} \sim \text{CV} = \text{EV} - \text{AC}$   
 $<1 \text{ is BAD} \sim \text{Negative is BAD}$

$\text{VAC} = \text{BAC} - \text{EAC}$   
 Negative is BAD



## 9.2.2 EVM -- Practice Exercises

### EVM Question 1

The ten million-dollar project is running ahead of schedule.

CPI is 0.75

Assuming this continues what is projected project cost upon completion?

- A. \$10,000,000
- B. \$7,500,000
- C. \$12,750,000
- D. \$13,333,333

Solution at right

Scenario here is that past CPI performance will continue throughout the project. This is scenario 2a presented on previous page.

We know this from:

"CPI is 0.75

Assuming this continues... "

So we can use the equation:

$$\begin{aligned} \text{EAC} &= \text{BAC} / \text{CPI} = \$10,000,000 / 0.75 \\ &= \$13,333,333 = \text{Answer "D"} \end{aligned}$$

Aside: The EVM formulae need to be understood within their respective scenarios, presented as Scenarios 1, 2a, 2b and 3 on the previous page.



## 9.2.3 EVM -- Practice Exercises, Cont'd

### EVM Question 2

The troubled project is over budget, with a CPI of 0.6

Work completed so far was expected to cost \$500,000

The BAC is \$2,000,000

What is the Estimate at completion, assuming that all future work is performed on budget?

- A. \$2,333,333
- B. \$2,000,000
- C. \$2,833,333
- D. \$2,300,000

Solution at right

Scenario here is that future work will continue on plan (Scenario 1), hence we want to use the equation:

$$EAC = AC + (BAC - EV)$$

We know the EV is \$500,000 ("Work completed so far was expected to cost \$500,000" so that planned value has been converted to earned value).

We know the BAC and the EV – now, if we can just find the AC, we can calculate the EAC.

We know the CPI is  $0.6 = EV/AC$ .

Trust your algebra, and rearrange to get:

$$AC = EV/0.6 = \$500,000 / 0.6 = \$833,333$$

$$\begin{aligned} \text{Now } EAC &= AC + (BAC - EV) \\ &= \$833,333 + (\$2,000,000 - \$500,000) \end{aligned}$$

$$EAC = \$2,333,333 = \text{answer "A"}$$



## 9.2.4 EVM -- Practice Exercises, Cont'd

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### EVM Question 3

The construction project is running behind schedule and over budget.

To bring the project in on budget, which of the following is true of the TCPI?

- A. The TCPI is less than 1.0
- B. The TCPI is negative
- C. The TCPI is greater than 1.0
- D. The TCPI is an index of how far off schedule the project is running

Solution at right

If the project is running over budget up until now, the CPI going forward would have to be 'GOOD' (greater than 1.0) in order to bring the project in on budget. Hence answer C is correct. "CPI going forward" is how you should think of TCPI.

TCPI is Scenario 3, as presented on pg. 19



## 9.2.5 EVM -- Practice Exercises, Cont'd

### EVM Question 4

The marketing event project was planned with a budget of \$750,000

Three fourths of the work has been completed at a cost of \$600,000.

What TCPI is required to ensure the final budget does not run over by more than 3 percent?

- A. 0.9375
- B. \$772,500
- C. 1.087
- D. \$22,500

Solution at right

Three fourths of the planned value is  
 $(3/4) * 750,000 = 562,500 = EV$

Since  $AC = \$600,000$  we are running over budget.

To come in close to budget, we probably need a TCPI greater than 1.0

Let's calculate the TCPI to finish at just 3 percent over budget:

$$EAC = 1.03 * (750,000) = 772,500$$

$$TCPI = (BAC - EV) / (EAC - AC)$$

$$TCPI = (750,000 - 562,500) / (772,500 - 600,000) = 1.087, \text{ So answer C is correct}$$



## 9.3 Cash Flow and Present Value Calculations

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**A bird in the hand is worth two in the bush**

**A dollar today is worth two dollars some years later**

- ♦ Say you invest \$100 today and earn 5% interest for one year
  - At the end of the year, your \$100 will increase to  $100 * (1.05)$
- ♦ If you re-invest for another year at 5%, you will have  $100 * (1.05) * (1.05)$ 
  - Or, in generalized terms,  $FV = PV * (1+r)^n$
  - where FV = Future Value
  - PV = Present Value
  - r = interest rate per period (per year)
  - n = number of periods (number of years)
- ♦ An alternate way of showing the equation:  **$PV = FV / (1+r)^n$** 
  - You will want to memorize this equation and practice using it

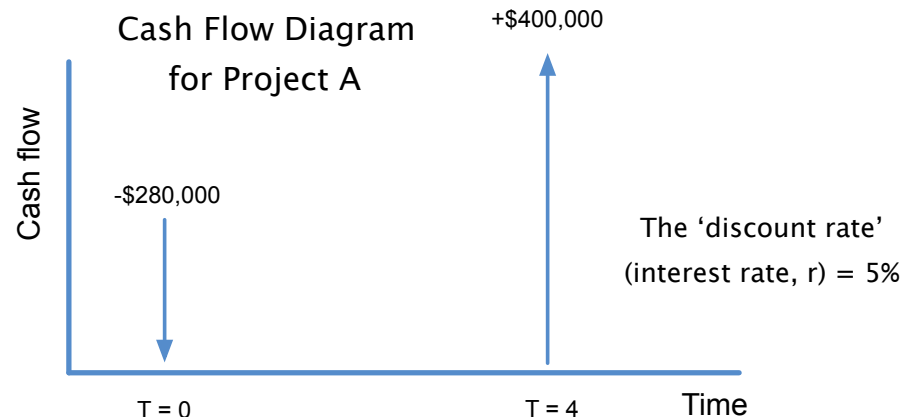


## 9.4 Present Value as a Project Evaluation Tool

### ◆ Present Value Calculations Can Help You to Compare & Select Projects

- ◆ Say you have project A which will yield benefits of \$400,000 in four years, and requires an investment of \$280,000 today, yielding profit of  $400,000 - 280,000 = 120,000$  (cash flow diagram below)...
- ◆ And say you have project B which will yield benefits of \$150,000 two years from now, and requires an investment of \$80,000 today.
- ◆ Before discounting, project A looks much better, with a profit of 120,000 vs. 70,000 for project B
- ◆ However, look what happens after taking into account the time value of money, using discount rate of 5%:
- ◆  $PV(A) = -280,000 + 400,000 / (1.05)^4 = -280,000 + 329,080 = \$49,080$
- ◆  $PV(B) = -80,000 + 150,000 / (1.05)^2 = -80,000 + 136,054 = \$56,054$
- ◆ Project B has the larger net present value, so it would be the preferable of the two projects

- There is an implicit assumption that you can only do one or the other of these two projects. This is typical of what you are likely to see on the exam
- In the exam, on a present value question, present value is all that matters. In the real world, other considerations will also apply



## 10.1 Brain Dump – Page 1 (Process Matrix)

### Brain Dump -- Page 1 (Process Matrix)

			Process Groups					
			Initial	Planning	Execution	My	Cat	
			Initiation	Planning	Execution	Monitor & Control	Close	
Knowledge Areas	I	7	Integration	Develop Project Charter	Develop Project Mgmt Plan	Direct & Mg Proj. Work Manage Proj. Knowledge	M&C Project Work Perform Integ. Change Control	Close Project or Phase
	See	6	Scope	<div>Out of respect for PMI's copyrights, this table is partially obscured.</div> <div>As a PMI member you will have access to a soft copy of The <i>PMBOK® Guide</i> and this table within.</div>				
	The	6	Time / Schedule					
	Crazy	4	Cost					
	Queen	3	Quality					
	Racing	6	Resource					
	Cute	3	Communications					
	Red	7	Risk					
	Puppies	3	Procurement					
	Speedily	4	Stakeholder Mgmt	ID Stakeholders	Plan SH Engagement	Manage SH Engagement	Monitor SH Engagement	
sum = 49								

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Based upon *PMBOK® Guide*, Sixth Edition, Table 1-4  
www.project-road.com





## 10.2 Brain Dump – Page 2 (Formulae)

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Sum WBS<sub>i</sub> = Sum PV<sub>i</sub> = PMB, Performance Measurement Baseline = BAC

SPI, Schedule Performance Index = EV / PV [ <1 BAD ]

SV, Schedule Variance = EV - PV [ Neg. BAD ]

CPI, Cost Performance Index = EV / AC [ <1 BAD ]

CV, Cost Variance = EV - AC [ Neg. BAD ]

EAC, Estimate at Completion = AC + Bottom-up ETC (Estimate to Complete)

Continuing work at planned rate of CPI = 1.0, EAC<sub>1</sub> = AC + (BAC - EV) = AC + ETC

If follow past CPI, EAC<sub>2a</sub> = BAC / CPI

If follow past CPI and SPI, EAC<sub>2b</sub> ~ AC + [ (BAC - EV) / (CPI \* SPI) ]

TCPI, To Complete Performance Index=(rem. wk/rem budget) = (BAC - EV)/(EAC - AC) = CPI<sub>f</sub>

VAC, Variance at Completion = BAC - EAC [ Neg. BAD ]

PERT~ Program Evaluation and Review Technique: Cost = (P + O + 4R) / 6

Present Value, PV = FV / (1+r)<sup>n</sup>

# Channels of Communication = n \* (n-1) / 2

Statistical Variance = σ<sup>2</sup>

where σ is 'sigma' = 'Standard Deviation' = (P-O)/6 (Approximation)

1σ = 68.26

2σ = 95.46

3σ = 99.73

6σ = 99.9997



# Thank You For Reading the Project Road e-Book

## Some Final Words

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Much more instruction is available through our website, in the form of a self-paced eLearning course. Further questions? Write to me at:

[bill@project-road.com](mailto:bill@project-road.com)

I'd love it if you would spread the word about my PMP study materials, sending people to my web site:

[www.project-road.com](http://www.project-road.com)

To pass the PMP® exam requires sustained effort. You can expect it to take three months to prepare for the exam. It is critical that you put in a consistent minimum of 8 quality hours per week.

If you make the commitment, then really make it. Create a written plan and measure your progress against that plan. For three months, make this project your top priority. The more you can focus and keep your head in the game, the more likely you are to actually succeed.

Carve out three months where nothing 'extra' is going on.

Stay focused. Work hard and smart.

You can do it! Be a Driving Force!

Bill B.

