



Version 6.1 Updated for the 2021
Project Management Professional (PMP)[®] Exam



Crosswind Success Series: PMP[®] Exam Bootcamp Manual

www.crosswindpm.com

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11.7. Project Schedule Management Formulas and Variables

Description	Formula	Variable (Component)	Example
Standard deviation is the measurement of variation within a distribution.	$(P - O) / 6$	Standard Deviation	$(20 - 4) / 6 = 2.67$
The variance is a measure of how a distribution is spread out.	$((P - O) / 6)^2$	Variance	$((20 - 4) / 6)^2 = 7.11$
Weighted Averaging (PERT) represents an estimation technique used to calculate duration estimates. This is used in a beta distribution.	$(P + O + (4 \times M)) / 6$ Or $t_E = (t_O + 4t_M + t_P) / 6$	PERT	$(20 + 4 + (4 \times 14)) / 6 = 13.33$
Simple Averaging (three-point estimate) is used in a triangular distribution.	$(P + O + M) / 3$	Three-Point Estimate	$(20 + 4 + 14) / 3 = 12.67$
Pessimistic estimate is a worse case estimate.	Provided on exam	P	P = 10
Optimistic estimate is a best-case estimate.	Provided on exam	O	O = 4
Most likely is the most realistic estimate.	Provided on exam	M (also could be R, "realistic")	M = 6
Slack represents the amount of time (typically days) an activity can be delayed without causing impact.	Slack = LS - ES or LF - EF	Slack (Also called Float)	$6 - 4 = 2$ or $18 - 10 = 8$
Forward pass formula calculates early start (ES) and early finish (EF) dates for an activity.	$EF = ES + \text{Duration} - 1$	EF	$6 + 2 - 1 = 7$ or $EF = 10$
Early Start is the earliest an activity can start.	Provided on exam	ES	ES = 4
Late Finish is the latest an activity can finish without causing impact.	Provided on exam	LF	LF = 18
Backward pass formula calculates late start (LS) and late finish (LF) dates for an activity.	$LS = LF - \text{Duration} + 1$	LS	$10 - 5 + 1 = 6$ or $LS = 6$

11.8. Project Schedule Management Terminology

Term	Description
Activity	A unique, scheduled segment of project work that typically has associated cost, duration, and resources; sometimes called a task
Activity Attributes	The characteristics of an activity that include activity codes, predecessor activities, successor activities, logical relationships, leads and lags, resource requirements, imposed dates, constraints, and assumptions
Activity Duration	The span of time, expressed as calendar units, between a scheduled activity's start and finish
Activity Duration Estimate	The projected duration of an activity
Activity Identifier	A unique number or code used to identify an activity that is used to eliminate confusion with a similarly named activity
Activity List	A listing of scheduled activities, with such details of a description, identifier, and scope of work, used to ensure that team members comprehend the work that will be performed during the project
Activity Network Diagrams	A graphical representation of the interconnectivity of project activities
Activity Resource Requirements	The determination of required resources for each work package and work period that are derived from the determination of required resources for each activity within the work package
Actual Duration	The amount of elapsed time between the start and finish of an activity
Adjusting Leads and Lags	A technique used to align project activities with their scheduled target dates
Analogous Estimating	An estimation technique that relies on data (schedule, cost, resources needed) from a similar activity or project
Applying Leads and Lags	A technique used to adjust time between activities by applying a lag (lengthening the schedule) or applying a lead (shortening the schedule)
Activity-on-arrow (AOA)	A network diagramming method in which activities are represented by arrows and connected at nodes to show their sequences; also known as ADM (arrow diagramming method)
Activity-on-node (AON)	A network diagramming method in which activities are represented by boxes or circles and connected via arrows; also known as PDM (precedence diagramming method)
Backward Pass	A network diagramming method that calculates the late start (LS) and late finish (LF) dates of each activity by working backward through the schedule from the project completion date
Bar Chart	A graphical representation of schedule-related information; typically, schedule activities or work breakdown structure components are displayed vertically on the far left of the chart, dates are displayed horizontally across the top of the chart, and activity durations are displayed as date-placed horizontal bars; also see Gantt chart
BIPERT (Biologic Extension of the Network Diagram)	A model for parallel programs that depicts ingoing (inclusive) and outgoing (exclusive) links
Bottom-Up Estimating	An estimating technique in which individual estimates are rolled up to create a summary estimate for the project
Buffer	Reserves used to alleviate risks that could negatively impact the budget or schedule
Burst	The separation (or divergence) of activities on a network diagram from a central node
Calendar Unit	The smallest time unit used in project schedules; it could be minutes, hours, shifts, days, weeks, months, quarters

Term	Description
Control Schedule	The process of observing project status in order to revise progress and administer schedule baseline revisions
Crashing	A compression technique to shorten the duration of the schedule, typically by adding additional resources to critical path activities
Critical Chain Method	A technique applied to the schedule so the project team can ascertain the amount of float needed to offset uncertainties or limited resources that appertain to a schedule path
Critical Path	The progression of activities that comprise the longest path through the project; used to ascertain the project duration
Critical Path Activity	An activity on the critical path of a project schedule
Critical Path Method	A technique used to assess minimum project duration and ascertain any schedule adaptability that appertains to logical network paths
Data Date	The point in time when the project data is recorded or monitored
Define Activities	The process of determining specific activities that must be executed in order to create project deliverables
Dependency	The relationship between two activities or between an activity and a milestone, also known as a logical relationship
Dependency Determination	The assignment of logical relationships between activities; logical relationships are designated as mandatory or discretionary and internal or external
Develop Schedule	The process of evaluating the progression and duration of activities, the demands on resources, and the limitations imposed on the schedule to create the model for the project schedule
Discrete Effort	Work that can be directly tied to the completion of WBS components or deliverables; the work must be measurable
Discretionary Dependency	An activity that the project manager (or other decision-maker) arbitrarily chooses to designate as a dependency; for example, making the reservation of a hotel room dependent on the purchase of a plane ticket; also known as soft logic
Dummy Activities	A zero duration activity used in the arrow diagramming method (ADM) to show a logical relationship; represented graphically with an arrow having a dashed line
Duration (DU or DUR)	The time, exclusive of holidays or other days in which business is not conducted and typically measured in workdays or workweeks, required to complete a specific activity or WBS component
Early Finish Date (EF)	The earliest possible date for an activity to be completed based upon the schedule network logic
Early Start Date (ES)	The earliest possible date for an activity to be started based upon the schedule network logic
Effort	The amount of labor (typically measured in hours, days, or weeks) required to complete an activity or WBS component
Estimate	An approximation of an outcome, based on experience or calculation, that is typically applied to cost, effort, or duration and usually contains a modifier (e.g. preliminary) and an accuracy indication (e.g. ±%)
Estimate Activity Durations	The process of approximating the number of work periods required to complete activities in consideration of available resources
Estimate Activity Resources	The process of approximating the amount of people and equipment needed to perform each activity
External Dependency	A relationship between project activities and non-project activities

Term	Description
Fast Tracking	A schedule compression technique that results in adjustments to the schedule and is used to perform sequenced activities in parallel as applicable
Finish Date	A point in time related to the completion of a schedule activity and typically qualified as actual, planned, estimated, scheduled, early, late, baseline, target, or current
Finish-to-finish (FF)	A dependency that requires the completion of a predecessor activity prior to the completion of the successor activity
Finish-to-start (FS)	A dependency that requires the completion of a predecessor activity prior to the start of the successor activity
Float	The amount of time an activity can be delayed without delaying successor activities or the project completion date
Forward Pass	A network diagramming method that calculates the early start (ES) and early finish (EF) dates of each activity by working forward through the schedule from the project inception date or a specific point in time
Free Float	The amount of time an activity can be delayed without violating any schedule limitation and without delaying the early start date of successor activities
Gantt Chart	A graphical representation that registers activities on the vertical axis and depicts the activity durations, based on their start and finish dates, on the horizontal axis; also known as a bar chart
Hammock Activity	A group of related activities reported as a single activity, sometimes called a summary activity
Imposed Date	A fixed date exacted on a scheduled activity or milestone, usually formulated as “not to start before” and “not to finish after”
Independent Estimates	The use of estimates created by an independent person or group to support internal project estimates
Lag	The amount of time, predicated on the start or finish of a predecessor activity, a successor activity must be delayed
Late Finish Date (LF)	The latest possible date for an activity to be completed based upon the schedule network logic, the project finish date, and schedule limitations
Late Start Date (LS)	The latest possible date for an activity to be started based upon the schedule network logic, the project finish date, and schedule limitations
Lead	The amount of time, predicated on the start or finish of a predecessor activity, a successor activity can be moved up
Level of Effort (LOE)	An activity that doesn’t produce an end product, but is required to support work-related activities or the project and involves a consistent rate of work over time; for example, liaising with the customer or performing administrative duties
Logical Relationship	A connection between two activities, or between an activity and a milestone
Mandatory Dependency	A relationship that is necessitated by virtue of a contractual requirement or the work itself
Master Schedule	A summary timetable that includes significant deliverables, key WBS components, and key milestones
Merge	A coming together (convergence) of activities on a network diagram
Milestone	A meaningful project event typically preceded by a series of activities that lead to its completion
Milestone List	A list of significant events in the project that may be designated as mandatory or optional
Milestone Schedule	A summary timetable that itemizes key milestones
Most Likely Duration	The most probable, or realistic, estimate of elapsed time for an activity based on data from previous projects or expert judgment

Term	Description
Near-critical Activity	Any schedule network diagram activity that is close to zero slack
Network Diagram	A schematic of logical relationships that make up the flow of activities on the project; always drawn from left to right
Network Logic	The assemblage of activity dependencies that constitutes the project schedule network diagram
Network Path	An uninterrupted series of activities depicted in a schedule network diagram and connected by dependencies
Node	A point in a schedule network that is the juncture of some or all dependency lines
Optimistic Duration	The shortest estimate of elapsed time or lowest cost for an activity based on data from previous projects or expert judgment
Parametric Estimating	A technique, effected by a calculation that employs an algorithm, used to determine cost or duration
Path Convergence	A node on a network diagram that indicates the merger of parallel paths; distinguished by an activity with multiple predecessors
Path Divergence	A dependency between a schedule activity and its multiple successors; sometimes called a burst
Percent Complete	The completed work estimate of an activity or WBS component expressed as a percentage
PERT Weighted Average	An estimating technique used to take the pessimistic, optimistic, and realistic (most likely) estimates to achieve a cumulative estimate
Pessimistic Duration	The longest estimate of elapsed time for an activity based on data from previous projects or expert judgment; typically used in three-point or parametric estimates
Plan Schedule Management	The process of creating policies, procedures, and documentation for the planning, executing, and controlling of the project schedule and related documents
Precedence Diagramming Method (PDM)	A technique used to create a schedule model in which activities are represented by nodes and graphically linked by one or more logical relationships in order to display the sequence in which the activities are to be performed
Precedence Relationship	A dependency in the precedence diagramming method; also known as a logical relationship
Predecessor Activity	An activity that logically precedes a successor activity
Program Evaluation and Review Technique (PERT)	An estimation technique, used when individual estimates are questionable, that involves applying a weighted average of optimistic, pessimistic, and most likely estimates
Project Calendar	A calendar that indicates working days and shifts available for project activities
Project Network Diagram	A view of the logical relationship (sequencing) of project activities
Project Schedule	The document, an output of the schedule model, that depicts linked activities with their estimated dates, durations, milestones, and resources
Project Schedule Management	Project schedule management encompasses the processes required to manage the timely conclusion of the project
Project Schedule Network Diagram	A graphical representation of the logical relationships that exist among activities in the project schedule
Resource Breakdown Structure	A representation of resources ranked by category and type

Term	Description
Resource Histogram	A bar chart depicting the amount of time a resource is scheduled to work over a specified number of time periods; resource availability and number of resources used may be considered for the purpose of comparison or contrast
Resource Leveling	A technique in which resource constraints dictate start and finish date adjustments in order to balance the demand for resources with the resources available
Resource Optimization Techniques	An approach to resource allocation that adjusts the schedule start and finish dates to ensure that resource assignments do not exceed predefined capacity limits; resource availability and number of resources used may be considered for the purpose of comparison or contrast
Resource Smoothing	An approach to resource allocation that more uniformly allocates a resource over time; used in cases where resource assignments exceed predefined capacity limits
Rolling Wave Planning	An iterative planning technique that involves detailed planning for near-term work and higher level planning for future work
Schedule Baseline	The authorized version of the schedule model that is used as the basis for comparison and can only be modified through a formal change control procedure
Schedule Compression	Any technique, such as crashing or fast tracking, used to shorten the duration of the schedule while maintaining the project scope
Schedule Data	Information associated with the management of a project schedule
Schedule Forecasts	Estimates, based on current project information, that are associated with future schedule events
Schedule Management Plan	The document, part of the project or program management plan, that authenticates standards and activities used to produce, track, and administer the schedule
Schedule Milestone	A major event in the project schedule; typically involves the start or completion of a major component of the project
Schedule Model	A model which includes activity durations and dependencies, used to produce the project schedule
Schedule Network Analysis	A technique used to determine late start (LS), late finish (LF), early start (ES), and early finish (EF) dates for incomplete schedule activities
Schedule Network Templates	A set of activities and relationships from past projects that meet current project needs
Scheduled Finish Date	The planned finish date for an activity, work package, or other piece of the schedule
Scheduled Start Date	The planned start date for an activity, work package, or other piece of the schedule
Scheduling Tool	A tool that accelerates scheduling by automatically producing activity start and finish dates based on the entry of activities, relationships, resources, and durations
Sequence Activities	The process of determining and recording dependencies between project activities
Start Date	The date work begins on an activity; can include qualifiers such as actual, planned, estimated, scheduled, early, late, target, baseline, and current
Start-to-finish (SF)	A dependency that requires the start of a predecessor activity prior to the completion of the successor activity
Start-to-start (SS)	A dependency that requires the start of a predecessor activity prior to the start of the successor activity
Sub-network	A section of the project schedule diagram, typically a work package or subproject, that is frequently used to depict a proposed schedule condition
Successor Activity	An activity that logically follows its predecessor activity

Term	Description
Summary Activity	An array of related schedule activities aggregated and displayed as a single activity
Target Completion Date (TC)	A requested project completion date that can be a constraint for the project
Target Finish Date (TF)	The date that the project (or activity) is anticipated to be completed
Target Schedule	A preliminary schedule that can be used during initial stages of planning; could differ from the baseline schedule at the conclusion of planning
Target Start Date (TS)	The planned start date of the project or activity
Task	An activity to be completed on the project
Three-Point Estimate	A technique used to evaluate the cost or duration of an activity by averaging the optimistic, pessimistic, and most likely estimates
Time-scaled Schedule Network Diagram	A graphical representation of the project schedule that displays relative to its duration; may include bar charts showing network logic (sequence)
Top-Down Estimating	An estimating technique in which the project manager estimates the cost or duration of the project based on the cost or duration of a previous project that is very similar to the current project
Total Slack (Total Float)	The amount of time an activity can slip (be delayed) from its early start date without delaying the overall finish date

The source for the above definitions is the Glossary of the Project Management Institute, *A Guide to the Project Management Body of Knowledge, (PMBOK® Guide) – Sixth Edition*, Project Management Institute Inc., 2017

11.9. Project Schedule Management Tests and Exercises

11.9.1. Project Schedule Management Network Diagramming Exercise

Answers are in section 11.10.1. Additional exercises are available at learn.crosswindpm.com.

Exercise - Project A – Moving across the country

Activity A: Get bids on moving company

Activity B: Choose a moving company

Activity C: Go through belongings and decide what to keep and what to sell/give away (This will help ensure that you select a moving company capable of the scope of the job.)

Activity D: Prepare for and do a yard sale for unwanted items

Activity E: Give away unwanted items not sold in yard sale

Activity F: Inventory remaining items

Activity G: Pack remaining items

Activity H: Move

Activity	Preceding Activities	Duration in days
A	Start	9
B	A, C	3
C	Start	13
D	C	9
E	D	2
F	E	10
G	F	11
H	B, G	3

1. Which path is the critical path and what is its duration?
2. What is the slack (float) for Activity B?
3. Which path has the longest (most) slack (float)?
4. What is the slack (float) of the path in question 3?
5. If Activity B slips from three days to six days, what is the critical path?
6. With the duration adjustment in question 5, what is the new slack (float) of Activity B?

11.9.2. Project Schedule Management Practice Test

Answers are in section 11.10.2.

1. Calculate the variance for the following: Pessimistic = 12, Optimistic = 2, Realistic = 5.
 - (A) 5
 - (B) 2.79
 - (C) 5.67
 - (D) Not enough information

2. Task C on the project has an ES of day three, an EF of day seven and an LS of day seven. Which of the following best describes this task?
 - (A) It has slack (float) of zero days
 - (B) It is behind schedule
 - (C) It has slack (float) of four days and duration of five days
 - (D) It has slack (float) of zero days and duration of four days

3. Which of the following is an example of a lag?
 - (A) The latest a new system can be ordered from the manufacturer without delaying the project
 - (B) The critical path
 - (C) A delay after the sheetrock (wallboard) is done in a house to allow it to dry before continuing work in that area
 - (D) The earliest a new system can be ordered from the manufacturer

4. Which of the following best describes the critical path slack (float)?
 - (A) It can be the shortest duration on the project
 - (B) It can be a positive number or zero
 - (C) It can be a negative number or zero
 - (D) It can be a positive number, negative number, or zero

5. The project manager is considering resource leveling the schedule to get the project back on track within resource constraints. Which of the following is most likely the project manager's primary concern?
 - (A) Tasks could be done in parallel instead of the way intended
 - (B) The project team might not be able to assign resources to activities
 - (C) The finish date could be pushed out further
 - (D) Resources working a more consistent number of hours each day

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6. You are the project manager for a retail merger project. You are getting ready to create the schedule. Specifically, you are getting ready to sequence activities. Which of the following best describes what you need to do this?
- (A) Activity lists and milestone lists
 - (B) Activity lists
 - (C) Resource estimates
 - (D) Work packages
7. Sam is a new project manager. He has been assigned to a new website creation project. He is reviewing the schedule with the team. He comes upon a hammock activity in the schedule. Which of the following best describes a hammock activity?
- (A) A summary activity with each task listed above it
 - (B) A summary activity with each task listed beneath it and the details of each task indented beneath that task
 - (C) An executive activity report
 - (D) A dummy used in the activity on arrow (AOA) diagrams
8. To improve efficiencies for the technical infrastructure project, the project manager has decided to apply resource leveling while building the schedule. Of the following, which is the best description of what he'll be doing?
- (A) Reviewing the logic bar chart to determine the optimal assignment of resources
 - (B) Obtaining an optimal balance between delivery deadlines and resource utilization
 - (C) Reviewing a resource allocation chart for peaks and valleys and making adjustments to create a level use of resources
 - (D) Tracking the day-to-day details of the project so he can reassign resources as needed
9. Of the following, which best describes a milestone schedule?
- (A) A high-level schedule that typically accompanies schedule variance reports
 - (B) A high-level schedule typically prepared for executives
 - (C) A high-level schedule typically used to determine the critical path
 - (D) A high-level schedule typically used in daily briefings with the project team

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10. Of the following statements about the critical path, which is accurate?
- (A) There can only be one critical path per project
 - (B) If ahead of schedule, a project can have negative slack (float)
 - (C) The least project risk occurs on the critical path
 - (D) The critical path is the longest path on the project network diagram
11. The e-commerce project is six weeks behind schedule with five team members working on it. Three of these team members are working on the critical path-related items. What is the slack (float) of the critical path?
- (A) Negative six weeks
 - (B) 30
 - (C) 0 (Zero)
 - (D) Not enough information
12. What are the Schedule knowledge area processes?
- (A) Plan schedule management, define activities, sequence activities, estimate activity resources, estimate activity durations, create baseline schedule, and control schedule
 - (B) Plan schedule management, create WBS, define activities, sequence activities, estimate activity durations, develop schedule, and control schedule
 - (C) Plan schedule management, define activities, create network diagram, estimate activity durations, develop schedule, and control schedule
 - (D) Plan schedule management, define activities, sequence activities, estimate activity durations, develop schedule, and control schedule
13. Which of the following duration estimate types is most likely to be used where there is minimal information known about the project?
- (A) Bottom-up
 - (B) Parametric
 - (C) Top-down
 - (D) Three-point

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14. You are the project manager on a defense project and are creating a network diagram. Activity A (3 days) and Activity B (6 days) can start immediately. Activity C (2 days) can start after Activity A is complete. Activity D (1 day) and Activity F (2 days) can start after Activity B is complete. Activity E (4 days) can start after Activity C and Activity D are complete. Activity G (5 days) can start after Activity D and Activity F are complete. When Activity E and Activity G are complete, the project is done. What is the critical path?
- (A) BDE
 - (B) ACE
 - (C) BFG
 - (D) BDG
15. Using the information in question 14, what is the slack (float) of Activity D?
- (A) Two days
 - (B) One day
 - (C) Four days
 - (D) Not enough information
16. Using the information in question 14, if Activity D increases from one to three days, what is the critical path, and what is the length?
- (A) BDE, 13 days
 - (B) ACE, 14 days
 - (C) BFG, 13 days
 - (D) BDG, 14 days
17. Sam, the project manager, is attending project management training at his company. Sam and the trainer are talking about new trends in scheduling and project management. Which of the following best describes what they are most likely discussing?
- (A) On-demand scheduling and critical path scheduling
 - (B) Waterfall and Gantt chart scheduling
 - (C) Iterative and waterfall scheduling
 - (D) Iterative and on-demand scheduling
18. Of the following, which best describes the logic bar chart?
- (A) The ideal tool to view activity sequencing
 - (B) A chart that represents high-level activities and their durations
 - (C) A chart used to track day-to-day activities
 - (D) A chart that represents the logical sequence of high-level activities

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19. In defining a milestone, which of the following is most correct?
- (A) It defines the phase of a project
 - (B) It has a duration of no more than one day
 - (C) It has a duration of zero (0)
 - (D) It has value in the project charter but not in the plan
20. You are the project manager for a cell site upgrade project. You have just performed the sequence activities process. What do you create next?
- (A) Duration estimates
 - (B) Activity lists
 - (C) Resource estimates
 - (D) Work packages
21. The project manager is putting together a schedule and is in the develop schedule process. Historically, the company has had issues with duration estimates being way off base because the team doesn't factor in things that can get in the way. Which of the following documents will they likely want to review in completing the develop schedule process?
- (A) Risk register
 - (B) Risk report
 - (C) Issue log
 - (D) Stakeholder register
22. The construction project is underway after encountering some initial schedule delays associated with the weather. As the team is working on the job site, the city building inspector shows up and asks for their building permit for the next phase. The project manager discovers it wasn't applied for. The city inspector explains it will take a week to process the application after the application is submitted. This is an example of what?
- (A) A city employee not wanting to do his job
 - (B) Discretionary dependency
 - (C) External mandatory dependency
 - (D) Mandatory dependency
23. You are estimating the duration of the project and you do not have much information about the overall estimate. Which of the following estimating techniques will you most likely use?
- (A) Analogous
 - (B) Bottom-up
 - (C) Three-point
 - (D) Top-down

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24. You and a fellow project manager are having a discussion about his project. He says its network diagram has two paths that have the maximum duration of 32 units. He also says there is no critical path because the longest paths are the same length and there can only be one critical path. Which of the following is a true statement?
- (A) You can have more than one critical path, but they are the longest paths on the project, and having more than one critical path increases your project risk
 - (B) The critical path is the shortest path on the project
 - (C) You can have more than one critical path, but they are the longest paths on the project, and having more than one critical path decreases your project risk
 - (D) You can have more than one critical path, but they are the shortest paths not the longest
25. You are estimating project duration. You don't have a lot of time to go into detail, so you estimate based on a past project that was similar to the current project. Which of the following estimating techniques is most likely used?
- (A) Analogous
 - (B) Bottom-up
 - (C) Three-point
 - (D) Top-down
26. The project manager is creating a project schedule network diagram using the activity on arrow format. Which of the following predecessor types can be used with this format of diagram?
- (A) Finish to finish (FF)
 - (B) Start to start (SS)
 - (C) Start to finish (SF)
 - (D) Finish to start (FS)
27. You are a project manager for a construction project to update a major roadway before football season starts. Once the season starts there will be a 500% increase in traffic. There has been a greater than normal amount of rain this season. The project manager is looking into ways to accelerate the schedule. They are not able to add resources as they cannot go over budget. They are looking into the ability to do some items in parallel. Which of the following is the project manager more likely to consider?
- (A) Crashing
 - (B) Fast tracking
 - (C) Resource leveling
 - (D) Re-baselining the schedule

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28. The project team is working together on detailed planning. They have had some issues coming to the same opinion, so they are creating a project schedule network diagram. What will this show the team?
- (A) The sequencing of the activities on the project
 - (B) The decomposition of the work of the project
 - (C) The schedule
 - (D) The duration estimate of the project
29. You are the project manager for a mortgage regulatory application project. You have just created the activity list and milestone list. What process preceded this work?
- (A) Define activities
 - (B) Sequence activities
 - (C) Plan schedule management
 - (D) Develop project management plan
30. The project manager is creating an estimate for a data warehouse. This is something he is quite experienced at. The client needs the estimate quickly. Which of the following types of estimates is he likely to provide?
- (A) Analogous
 - (B) Gut feel
 - (C) Bottom-up
 - (D) Parametric

11.10. Project Schedule Management Answers for Tests and Exercises

11.10.1. Project Schedule Management Network Diagramming Exercise Answers

Exercise - Project A – Moving across the country - Answers

Activity A: Get bids on moving company

Activity B: Choose a moving company

Activity C: Go through belongings and decide what to keep and what to sell/give away (This will help ensure that you select a moving company capable of the scope of the job)

Activity D: Prepare for and do a yard sale for unwanted items

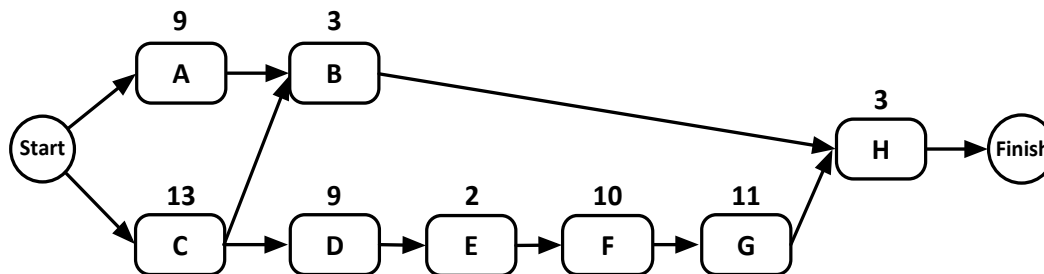
Activity E: Give away unwanted items not sold in yard sale

Activity F: Inventory remaining items

Activity G: Pack remaining items

Activity H: Move

Activity	Preceding Activities	Duration in days
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B	A, C	3
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E	D	2
F	E	10
G	F	11
H	B, G	3



1. Which path is the critical path and what is its duration?

The paths on the network diagram are as follows.

$$A + B + H \quad 9 + 3 + 3 = 15$$

$$C + B + H \quad 13 + 3 + 3 = 19$$

$$C + D + E + F + G + H \quad 13 + 9 + 2 + 10 + 11 + 3 = 48$$

The critical path is the longest path; thus, C + D + E + F + G + H is the critical path, and the duration is 48.

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2. What is the slack (float) for Activity B?

Calculate the slack (float) for Activity B by taking the critical path length and subtracting the duration of the longest path that has Activity B in it. This path is C + B + H and the slack (float) for Activity B is $48 - 19 = 29$.

3. Which path has the longest (most) slack (float)?

The shortest path is subtracted from the critical path duration. That is $48 - 15 = 33$ which is path A + B + H.

4. What is the slack (float) of the path in question 3?

The shortest path is subtracted from the critical path duration. That is $48 - 15 = 33$.

5. If Activity B slips from three days to six days, what is the critical path?

Increasing Activity B from three to six days doesn't change the critical path because there are more than three days of slack (float) between every path with B on it. The critical path is still C + D + E + F + G + H for a total of 48.

6. With the duration adjustment in question 5, what is the new slack (float) of Activity B?

The new slack (float) for Activity B is 26 days. Calculate it by taking the critical path (48 days) and subtracting from it the revised path of C + B + H (22 days), $48 - 22 = 26$.

11.10.2. Project Schedule Management Practice Test Answers

We recommend that you download answer sheets from the Crosswind website, so you can practice the test as many times as you like.

1. Calculate the variance for the following: Pessimistic = 12, Optimistic = 2, Realistic = 5.

Correct Answer: (B) 2.79

Explanation: The formula for variance is $((\text{Pessimistic} - \text{Optimistic}) / 6)^2$ or $((P - O) / 6)^2$. The answer is 2.79. [Crosswind Manual 11.7; No *PMBOK® Guide* Reference]

2. Task C on the project has an ES of day three, an EF of day seven and an LS of day seven. Which of the following best describes this task?

Correct Answer: (C) It has slack (float) of four days and duration of five days

Explanation: The task has a slack (float) of four days and a duration of five days. The slack (float) is calculated by subtracting the ES of day three from the LS of day seven for a slack (float) of four days. To calculate the duration, do not subtract the early start day from the early finish day. Count the early start day, the early finish day, and each day in between: in this case, count day three, day four, day five, day six, and day seven for a duration of five days. [Crosswind Manual 11.5.9; *PMBOK® Guide* 6.5.2.2]

3. Which of the following is an example of a lag?

Correct Answer: (C) A delay after the sheetrock (wallboard) is done in a house to allow it to dry before continuing work in that area

Explanation: A delay after the sheetrock is done to allow it to dry before continuing work in that area is an example of a lag. The delay is not part of either activity but occurs between the activities. The other answers are distracters. [Crosswind Manual 11.3.5; *PMBOK® Guide* 6.3.2.3]

4. Which of the following best describes the critical path slack (float)?

Correct Answer: (D) It can be a positive number, negative number, or zero

Explanation: The critical path slack (float) can be any number. Technically the slack (float) of the critical path is zero, but if you are ahead of schedule it is a positive number and if you are behind schedule, it is a negative number. It is actually the longest path on the project, not the shortest. [Crosswind Manual 11.5.4; *PMBOK® Guide* 6.5.2.2]

5. The project manager is considering resource leveling the schedule to get the project back on track within resource constraints. Which of the following is most likely the project manager's primary concern?

Correct Answer: (C) The finish date could be pushed out further

Explanation: The item of most concern to the project manager is pushing out the finish date of the project as a result of resource leveling. Resources working a more consistent number of hours each day is a characteristic of resource leveling, but it isn't typically a concern. Doing tasks in parallel relates to fast tracking a schedule. Not being able to assign resources to activities would relate to crashing a schedule. [Crosswind Manual 11.5.11; *PMBOK® Guide* 6.5.2.2]

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6. You are the project manager for a retail merger project. You are getting ready to create the schedule. Specifically, you are getting ready to sequence activities. Which of the following best describes what you need to do this?

Correct Answer: (A) Activity lists and milestone lists

Explanation: The sequence activities process creates the project schedule network diagram. This shows the order or connectivity of the activities. The define activities process precedes this process and creates the activity lists and milestone lists. Work packages come from decomposing project work in the create work breakdown structure processes. [Crosswind Manual 11.2, *PMBOK® Guide* 6.2]

7. Sam is a new project manager. He has been assigned to a new website creation project. He is reviewing the schedule with the team. He comes upon a hammock activity in the schedule. Which of the following best describes a hammock activity?

Correct Answer: (B) A summary activity with each task listed beneath it and the details of each task indented beneath that task

Explanation: The hammock activity is a summary activity with each task beneath it and the details of each task indented beneath that task. The earliest start (ES) date of the tasks comprising the activity is the start date of the hammock and the last date of the tasks comprising the activity is the final date of the hammock. It can be used for executive reporting, but that isn't the main purpose and there are better tools for that such as a milestone schedule. The AOA answer is a distracter. [Crosswind Manual 11.5.15; *PMBOK® Guide* 6.5.3.2]

8. To improve efficiencies for the technical infrastructure project, the project manager has decided to apply resource leveling while building the schedule. Of the following, which is the best description of what he'll be doing?

Correct Answer: (C) Reviewing a resource allocation chart for peaks and valleys and making adjustments to create a level use of resources

Explanation: Resource leveling consists of reviewing a resource allocation chart for peaks and valleys and making adjustments to create a level use of resources. Applying resource leveling and schedule compression helps the PM obtain an optimal balance between delivery deadlines and resource utilization. The other answers are distracters. [Crosswind Manual 11.5.11; *PMBOK® Guide* 6.5.2.3]

9. Of the following, which best describes a milestone schedule?

Correct Answer: (B) A high-level schedule typically prepared for executives

Explanation: A milestone schedule is high-level schedule typically prepared for executives. The milestone schedule records a 0 duration for each milestone. [Crosswind Manual 11.5.14; *PMBOK® Guide* 6.5.3.2]

10. Of the following statements about the critical path, which is accurate?

Correct Answer: (D) The critical path is the longest path on the project network diagram

Explanation: The critical path is the longest path on the project network diagram. There can be multiple critical paths. If the project is behind schedule, there can be negative slack (float). The greatest project risk occurs along the critical path. [Crosswind Manual 11.5.5; *PMBOK® Guide* 6.5.2.2]

11. The e-commerce project is six weeks behind schedule with five team members working on it. Three of these team members are working on the critical path-related items. What is the slack (float) of the critical path?

Correct Answer: (A) Negative six weeks

Explanation: Technically, a critical path has a slack (float) of zero. If the project is truly behind schedule, and the baseline date is still being used as the reference, the project could actually have negative slack (float) on the critical path. In this case, the negative slack (float) is six weeks. [Crosswind Manual 11.5.4; *PMBOK® Guide* 6.5.2.2]

12. What are the Schedule knowledge area processes?

Correct Answer: (D) Plan schedule management, define activities, sequence activities, estimate activity durations, develop schedule, and control schedule

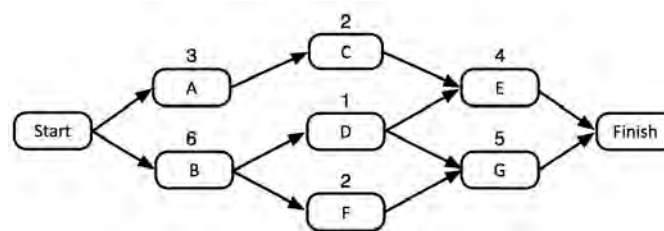
Explanation: The Schedule processes are Plan Schedule Management, Define Activities, Sequence Activities, Estimate Activity Durations, Develop Schedule, and Control Schedule. [Crosswind Manual Chapter 11 Introduction; *PMBOK® Guide* Chapter 6 Introduction]

13. Which of the following duration estimate types is most likely to be used where there is minimal information known about the project?

Correct Answer: (C) Top-down

Explanation: The top-down estimate, sometimes called an analogous estimate, is an estimate used when there is not a lot of detail. The estimate is based upon overall project characteristics and can be applied when you have past experience in the area. The parametric estimate is used when parameters and quantity are used. For example \$2 a square foot for carpet. The three-point estimate is based upon best case, worse case, and realistic estimates. [Crosswind Manual 11.4.1; *PMBOK® Guide* 6.4.2]

14. You are the project manager on a defense project and are creating a network diagram. Activity A (3 days) and Activity B (6 days) can start immediately. Activity C (2 days) can start after Activity A is complete. Activity D (1 day) and Activity F (2 days) can start after Activity B is complete. Activity E (4 days) can start after Activity C and Activity D are complete. Activity G (5 days) can start after Activity D and Activity F are complete. When Activity E and Activity G are complete, the project is done. What is the critical path?



Correct Answer: (C) BFG

Explanation: The critical path is the longest path in the diagram. Of the four paths, BFG is the longest at 13 days. ACE is nine days long. BDE is 11 days. BDG is 12 days. [Crosswind Manual 11.5.8; *PMBOK® Guide* 6.5.2.2]

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15. Using the information in question 14, what is the slack (float) of Activity D?

Correct Answer: (B) One day

Explanation: The longest path with Activity D on it is path BDG with a duration of 12 days. The critical path of BFG is 13 days. Subtracting the length of BDG from the critical path (13-12) shows a difference of one day. This is the slack (float) of Activity D. [Crosswind Manual 11.5.8; *PMBOK® Guide* 6.5.2.2]

16. Using the information in question 14, if Activity D increases from one to three days, what is the critical path, and what is the length?

Correct Answer: (D) BDG, 14 days

Explanation: By increasing Activity D from one day to three days the path BDG increases to fourteen days. This is the longest of the paths on the network diagram. [Crosswind Manual 11.5.8; *PMBOK® Guide* 6.5.2.2]

17. Sam, the project manager, is attending project management training at his company. Sam and the trainer are talking about new trends in scheduling and project management. Which of the following best describes what they are most likely discussing?

Correct Answer: (D) Iterative and on-demand scheduling

Explanation: The two most notable trends currently impacting scheduling are iterative scheduling and on-demand scheduling. Iterative scheduling is a type of adaptive project management used to deliver incremental value to the customer during an iteration. On-demand scheduling is an approach, typically used in a Kanban system, used to limit the team's work in progress in order to balance demand against throughput. [Crosswind Manual Chapter 11 Introduction; *PMBOK® Guide* Chapter 6 Trends and Emerging Practices]

18. Of the following, which best describes the logic bar chart?

Correct Answer: (C) A chart used to track day-to-day activities

Explanation: A logic bar chart, sometimes called a Gantt chart, is a common chart used to track the day-to-day details of the project. [Crosswind Chapter 11.5.13; *PMBOK® Guide* 6.5.3.2]

19. In defining a milestone, which of the following is correct?

Correct Answer: (C) It has a duration of zero (0)

Explanation: The milestone has a duration of zero. The milestone is typically used to define the completion of a series of activities. The other answers are distracters. [Crosswind Manual 11.5.14; *PMBOK® Guide* 6.5.3.2]

20. You are the project manager for a cell site upgrade project. You have just performed the sequence activities process. What do you create next?

Correct Answer: (A) Duration estimates

Explanation: The estimate activity durations process follows the sequence activities process. Activity lists being created precede the sequence activities process. Resource estimates comes from the resource knowledge area. Work packages comes from the scope knowledge area. [Crosswind Manual 11.4, *PMBOK® Guide* 6.4]

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21. The project manager is putting together a schedule and is in the develop schedule process. Historically, the company has had issues with duration estimates being way off base because the team doesn't factor in things that can get in the way. Which of the following documents will they likely want to review in completing the develop schedule process?

Correct Answer: (A) Risk register

Explanation: The risk register is an input to the develop schedule process. The risk register can be referenced when integrating all the pieces of the schedule together into a whole, while factoring in identified risks. The risk report is a distractor. The issue log while it could be referenced is used to document things that require attention. The stakeholder register shows stakeholders, goals, management strategies and any other relevant details about the stakeholders. [Crosswind Manual 11.5, *PMBOK® Guide* 6.5]

22. The construction project is underway after encountering some initial schedule delays associated with the weather. As the team is working on the job site, the city building inspector shows up and asks for their building permit for the next phase. The project manager discovers it wasn't applied for. The city inspector explains it will take a week to process the application after the application is submitted. This is an example of what?

Correct Answer: (C) External mandatory dependency

Explanation: The external mandatory dependency is a required dependency that is outside the organization's control that is required. The building inspector fits this criterion. The mandatory dependency is required and internal to the project. The discretionary dependency is at the option of the project manager and team. The city employee answer is a distractor. [Crosswind Manual 11.3.1; *PMBOK® Guide* 6.3.2.2]

23. You are estimating the duration of the project and you do not have much information about the overall estimate. Which of the following estimating techniques will you most likely use?

Correct Answer: (D) Top-down

Explanation: Answering this question may be difficult since analogous and top-down are very close in meaning. Generally analogous and top-down are thought of as the same. They differ when the top-down estimate doesn't have a lot of detail. The analogous estimate is used when the estimate is based on something you or the company has done before. [Crosswind Manual 11.4.1; *PMBOK® Guide* 6.4.2]

24. You and a fellow project manager are having a discussion about his project. He says the network diagram has two paths that have the maximum duration of 32 units. He also says there is no critical path because the longest paths are the same length and there can only be one critical path. Which of the following is a true statement?

Correct Answer: (A) You can have more than one critical path, but they are the longest paths on the project, and having more than one critical path increases your project risk

Explanation: The critical path is the longest path on the project. If you have more than one path of identical length, you have multiple critical paths. The more of them you have, the riskier the project is. [Crosswind Manual 11.5.5; *PMBOK® Guide* 6.5.2.2]

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25. You are estimating project duration. You don't have a lot of time to go into detail, so you estimate based on a past project that was similar to the current project. Which of the following estimating techniques is most likely used?

Correct Answer: (A) Analogous

Explanation: Answering this question may be difficult since analogous and top-down are very close in meaning. Generally analogous and top-down are thought of as the same. They differ when the analogous estimate is used when the estimate is based on something you or the company has done before. The top-down estimate doesn't have a lot of detail. [Crosswind Manual 11.4.1; *PMBOK® Guide* 6.4.2]

26. The project manager is creating a project schedule network diagram using the activity on arrow format. Which of the following predecessor types can be used with this format of diagram?

Correct Answer: (D) Finish to start (FS)

Explanation: The activity on arrow format is a manually drawn format in most cases for creating a network diagram. It only uses a finish to start (FS) predecessor. All four answers can be used with the activity on node format which is typically used with software applications that create project schedule network diagrams. [Crosswind Manual 11.3.4, *PMBOK® Guide* 6.3.2.1]

27. You are a project manager for a construction project to update a major roadway before football season starts. Once the season starts there will be a 500% increase in traffic. There has been a greater than normal amount of rain this season. The project manager is looking into ways to accelerate the schedule. They are not able to add resources as they cannot go over budget. They are looking into the ability to do some items in parallel. Which of the following is the project manager more likely to consider?

Correct Answer: (B) Fast tracking

Explanation: The two approaches for shortening a schedule are fast tracking and crashing. Crashing is adding additional resources to critical path activities. Fast tracking is the best option here, as they are looking at doing things in parallel. Resource leveling gets rid of over allocation of resources. Re-baselining the schedule doesn't do anything other than likely officially pushing the finish date out. [Crosswind Manual 11.5.10, *PMBOK® Guide* 6.5.2.6]

28. The project team is working together on detailed planning. They have had some issues coming to the same opinion, so they are creating a project schedule network diagram. What will this show the team?

Correct Answer: (A) The sequencing of the activities on the project

Explanation: The project schedule network diagram shows the sequencing of the activities on the project. The work breakdown structure (WBS) shows the decomposition of the work of the project. The duration estimate of the project comes from the schedule. [Crosswind Manual 11.3.2; *PMBOK® Guide* 6.3.3.1]

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29. You are the project manager for a mortgage regulatory application project. You have just created the activity list and milestone list. What process preceded this work?

Correct Answer: (C) Plan schedule management

Explanation: The define activities process creates activity lists and milestone lists. The process that precedes that is plan schedule management which creates the schedule management plan. Sequence activities creates the project schedule network diagram. Develop project management plan is a distractor. [Crosswind Manual 11.1, *PMBOK® Guide* 6.1]

30. The project manager is creating an estimate for a data warehouse. This is something he is quite experienced at. The client needs the estimate quickly. Which of the following types of estimates is he likely to provide?

Correct Answer: (A) Analogous

Explanation: The analogous estimate is also considered a form of a top-down estimate, can be quickly created because it is based on expert knowledge of an area from previous projects. Parametric is an estimating technique that uses parameters, such as so much time per unit. A bottom-up estimate is created by the team and can take time to create because of the details. Gut feel is a distracter. [Crosswind Manual 11.4.1; *PMBOK® Guide* 6.4.2]