

Resource Management

N I N E

As you might expect, resource management includes the project manager's responsibilities for planning, acquiring, and managing the project team. But there is more. In this chapter—and on the PMP exam—the term "resources" refers to more than the team and other people from within or outside the organization who may be working on the project. It also encompasses the facilities, equipment, and materials (physical resources) that are required to perform the work of the project. You will see in this chapter that most of the processes of resource management include the project manager's responsibilities with regard to both human and physical resources.

Many topics covered in this chapter may seem easy, but you need to identify any misperceptions, and expand your project management knowledge. Review the following list of the most common knowledge gaps people have about resource management, and look for others that apply to you as you read the rest of this chapter:

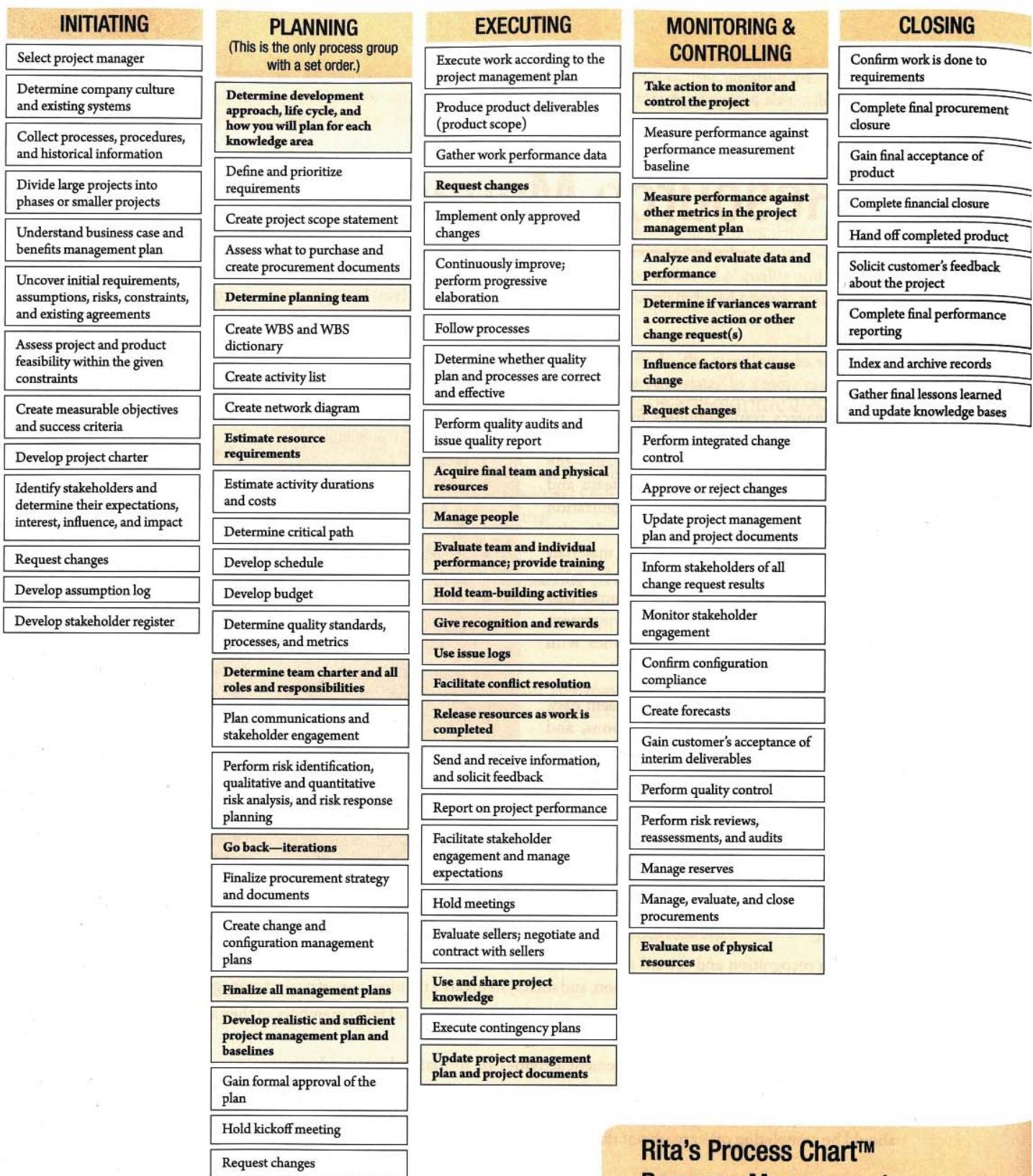
- "Resources" refers to more than just human resources; it also includes materials, equipment, supplies, and anything else needed to complete the project.
- Creating a recognition and reward system is an important resource management function, and such systems are a required part of project management.
- The project manager is responsible for improving the competencies of team members so they are able to perform the work on the project most effectively.
- The project manager's resource management activities are formal and require documentation.
- There should be clear roles and responsibilities on the project. For example, who should be assigned to assist the project manager, who should take on specific responsibilities at meetings, and who should be completing other work not directly related to project activities?

QUICKTEST

- Resource management process
- Resource responsibilities for project managers
- Resource management plan
- Recognition and reward systems
- Team building
- Conflict resolution techniques
- Team performance assessment
- Issue log
- Responsibility assignment matrix (RAM)
- RACI chart
- Organizational breakdown structure
- Resource breakdown structure
- Resource histogram
- Team charter
- Motivation
- Training needs of team members
- Management and leadership styles
- Powers of the project manager
- Emotional intelligence
- Influencing
- Problem-solving method
- Sources of conflict
- Preassignment
- Negotiation
- Multicriteria decision analysis
- Colocation
- Virtual teams
- Communications technology
- Tuckman ladder

Resource Management

N I N E



Rita's Process Chart™
Resource Management
Where are we in the project management process?

- The exam assumes, unless stated otherwise, that the project is operating in a matrix environment. Therefore, topics such as motivation, conflict management, and powers of the project manager are more challenging than you might expect. These items need to be planned for and managed throughout the project.
- Projects are planned by the team and coordinated by the project manager.
- The project manager must continually confirm resource availability.
- On large projects, the project manager might have some team members help with project management activities. These people are called the project management team. So, the project team consists of the project manager, the project management team, and the other members of the team who will be doing the work of the project.
- The project manager formally plans team-building activities in advance; these activities are a required part of project management.
- The processes of resource management are repeated and updated throughout the project.
- Geographically and culturally diverse teams require additional attention and planning by the project manager.
- The project manager is responsible for controlling physical resources on the project; this is not only the responsibility of procurement or other departments that may provide physical resources.

If you manage small projects (those lasting only a few months or those that involve less than 20 people), keep in mind that resource management responsibilities increase as the size of the project increases. The resource management process takes time and effort to plan. You must do things such as identify all resources needed to complete the project (including the required skills of team resources and the required quality and grade of material or equipment), define everyone's roles, create reward systems, provide training and motivation for team members, manage the use of physical resources, and track performance.

TRICKS OF THE TRADE

Many of the topics described in this chapter are not directly tested on the exam. It is best to read this chapter two or three times and make a list of the gaps in your knowledge as you read. After a couple of passes through this chapter, you will likely know the concepts well enough to be able to understand the ways in which they are applied in questions on the exam.

The following should help you understand how each part of resource management fits into the overall project management process:

The Resource Management Process	Done During
Plan Resource Management	Planning process group
Estimate Activity Resources	Planning process group
Acquire Resources	Executing process group
Develop Team	Executing process group
Manage Team	Executing process group
Control Resources	Monitoring and controlling process group

Roles and Responsibilities

Roles and responsibilities go far beyond just a title. You know you are the project manager, but what does that mean as the project work is being done? Do you know what decisions you can make and enforce, and when you need the approval of someone higher in the organization? Do you know what to expect from functional managers and your project sponsor? What about the team? Do they know their responsibilities, and when they need to escalate a situation?

Project roles and responsibilities, and the authority that goes with them, are agreed upon in planning, and documented in the resource management plan.

The following exercise tests your knowledge of some typical roles on a project.

Exercise Did you complete the exercise on project roles in the Project Management Framework chapter? Your understanding of that content will impact how well you do on this exercise. You may want to review those pages before starting this exercise, or use the information in that exercise to fill your gaps.

This exercise is designed to help you answer situational questions on the exam dealing with project roles and responsibilities. If you disagree with some of the answers, make sure you are not reading something into the question, and assess whether it indicates a gap in your project management knowledge.

In the following table, write the initials of the key role responsible for solving each of the problems listed. Because much of the confusion of roles is between the team members (T), the project manager (PM), the sponsor (SP), and the functional manager (FM), this exercise is limited to those roles. Consider what you have learned about project roles, and remember to keep matrix organizations in mind when reading through these situations.

Situation	Key Role
1 Two project team members are having a disagreement.	
2 There is a change to the overall project deliverable.	
3 A functional manager is trying to pull a team member off the project to do other work.	
4 The project manager does not have the authority to get things done.	
5 There are not enough resources to complete the project.	
6 The team is unsure of what needs to happen when.	
7 An activity needs more time and will cause the project to be delayed.	
8 An activity needs more time without causing the project to be delayed.	
9 A team member is not performing.	
10 The team is not sure who is in charge of the project.	
11 There is talk that the project may no longer be needed.	
12 The sponsor provides an unrealistic schedule objective.	
13 The team is in conflict over priorities between activities.	
14 The project is behind schedule.	
15 A team member determines that another method should be used to complete an activity.	
16 The project is running out of funds.	
17 Additional work that will increase cost and that was not identified during the risk management process is added to the project.	

Answer

Situation	Key Role
1 Two project team members are having a disagreement. <i>The people involved in the conflict should attempt to solve it themselves.</i>	T
2 There is a change to the overall project deliverable. <i>A change to the project deliverable is a change to the project charter. Only the sponsor can approve changes to the project charter.</i>	SP
3 A functional manager is trying to pull a team member off the project to do other work. <i>The project manager must give team members enough information (such as the schedule, network diagram, project management plan, and identified risks) so they can manage their own workloads. Because the word "trying" is used, we know this situation is occurring at the present time. If the question used the words "has pulled," the answer would be the project manager. Read situational questions carefully.</i>	T
4 The project manager does not have the authority to get things done. <i>It is the sponsor's role to give the project manager authority via the project charter.</i>	SP
5 There are not enough resources to complete the project. <i>The sponsor and functional manager control resources.</i>	SP/FM
6 The team is unsure of what needs to happen when. <i>It is the project manager's role to take the individual estimates, combine them into the project schedule, and communicate that schedule to team members.</i>	PM
7 An activity needs more time and will cause the project to be delayed. <i>Notice the word "will." This means the evaluation by the team is completed and there is no available reserve, since the project completion date is most likely included in the project charter. Any such changes are changes to the project charter and require sponsor involvement.</i>	SP
8 An activity needs more time without causing the project to be delayed. <i>Think about integrated change control here. It is the project manager's role to look for impacts to the other project constraints.</i>	PM
9 A team member is not performing. <i>In a matrix environment, the project manager and the functional manager share responsibility for directing resources.</i>	PM/FM
10 The team is not sure who is in charge of the project. <i>The sponsor designates the project manager in the project charter.</i>	SP
11 There is talk that the project may no longer be needed. <i>It is the sponsor's role to protect the project from changes, including such a large change as termination (unless it becomes clear that the project is no longer meeting the objectives of the organization).</i>	SP

Situation	Key Role
12 The sponsor provides an unrealistic schedule objective. <i>Only the sponsor can make a change to the project charter (including schedule objectives or constraints). The project manager must provide evidence that the schedule is unrealistic and work with the sponsor to resolve it.</i>	SP
13 The team is in conflict over priorities between activities. <i>It is the project manager's role to settle any such conflicts and to provide a network diagram and critical path. It is the sponsor's or program/portfolio manager's role to set priorities between projects.</i>	PM
14 The project is behind schedule. <i>Only the project manager can control the overall project schedule.</i>	PM
15 A team member determines that another method should be used to complete an activity. <i>The team member has control over their activities as long as the team member meets the time, quality, cost, and scope objectives in the project management plan. The team member must keep the project manager informed of these changes, however, so the project manager can integrate them into the rest of the project and look for any impacts.</i>	T
16 The project is running out of funds. <i>It is the sponsor's role to provide funding for the project.</i>	SP
17 Additional work that will increase cost and that was not identified during the risk management process is added to the project. <i>The fact that the change was not identified in the risk management process and is additional work means it was not included in the original project budget (or the contingency reserve). Therefore, the sponsor must be involved in providing additional funds.</i>	SP

If you got many of the answers wrong, reread the discussions of roles and responsibilities in the Project Management Framework chapter, and review the exact wording of the situations presented here. With such a brief description, it can be easy to misinterpret a question. Although this exercise asked you to identify the key role responsible for solving the problems, you may have preferred the word “decide” or the words “make the final decision” to describe what should happen in some of the situations. This exercise should help prepare you to interpret questions on the exam. It is meant to make you think!

Resource Responsibilities for Project Managers This chapter and the Stakeholder Management, Communications Management, and the Professional and Social Responsibility chapters discuss how a project manager needs to manage and interact with team members, other stakeholders, and managers. Make sure you connect the ideas in these chapters in your mind.

TRICKS OF THE TRADE A trick to correctly answering exam questions on this topic is to realize that as a project manager, you have responsibilities regarding resources. Some of these are ethical responsibilities, as described in the Professional and Social Responsibility chapter, while others are administrative. The best way to approach administrative responsibilities is to think of your team as if they are employees who report directly to you. Project managers have some responsibilities similar to those of a manager.

The following is a list of project manager responsibilities to keep in mind when taking the exam:

- Determine what human and physical resources you will need.
- Negotiate with resource managers for the optimal available resources.
- Work with the procurement department if necessary.
- Confirm availability of assigned resources.
- Create a project team directory.
- Create project job descriptions for team members and other stakeholders.
- Make sure all roles and responsibilities on the project are clearly assigned.
- Understand the team members' training needs related to their work on the project, and make sure team members get any necessary training.
- Create a formal plan—the resource management plan—covering topics such as how the team will be involved in the project and what roles they will perform.
- Send out letters of commendation to team members and their managers to recognize exceptional performance of project work.
- Make sure the needs of all team members are acknowledged and considered.
- Create recognition and reward systems.
- Use emotional intelligence (EI).
- In a change-driven environment, encourage self-organizing teams and provide support as needed.
- Plan for and manage communications challenges specific to virtual teams.
- Tailor the resource management plan as appropriate to the needs of the project.
- Encourage collaboration among team members.
- Determine what physical resources will be needed on the project, and when they will be needed.
- Determine the quality, grade, and amount of physical resources needed on the project.
- Plan ahead to ensure physical resources are available and accessible when needed.
- Use resources efficiently.
- Look for ways to improve resource utilization.
- Evaluate and select appropriate methods of managing physical resources.

Plan Resource Management PAGE 312

Process Plan Resource Management
Process Group Planning
Knowledge Area Resource Management

This plan encompasses the management of human resources as well as physical resources. For both types of resources, the plan must answer questions such as the following:

- What resources are required?
- What quantity of each type of resource is needed to complete the work of the project?
- When and for how long will each resource be needed?
- How will the resources be acquired?
- Are these resources available internally, or will the procurement department need to be involved?
- What will be the cost of these resources?
- Is there a limited time during which the resources will be available for the project?
- How will resources be managed throughout the project?

Early in the project, the project manager will have to determine the approach they will take to managing the project, unless this has been determined in advance by management. As discussed earlier in the Project Management Processes chapter, two common approaches to projects are plan-driven and change-driven. On a project following a plan-driven approach, as much resource management planning as possible will be done early in the project. On a project following a change-driven approach, planning and securing resources will likely occur as a part of each iteration or release. The concepts discussed in the next three sections are often associated with change-driven projects.

Lean The term “lean” comes from the concept of lean manufacturing, a practice that is over 100 years old. The principle behind lean is to remove waste from a process. Agile is a derivative of this approach, which has evolved to encompass the efficient use of human as well as physical resources. The goal of lean management is to eliminate waste of time, effort, and resources, as shown in figure 9.1.

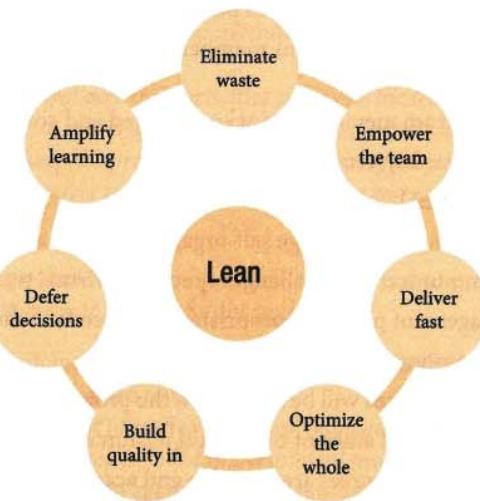


FIGURE 9.1 *Lean core concepts*

Kaizen The Japanese term *kaizen* is synonymous with continuous improvement. It literally means to alter (*kai*) and improve or make better (*zen*). This term is used in quality management, but it also applies to other aspects of a project, including resource management.

Just in Time (JIT) If the project is using a just in time (JIT) system for physical resources, the strategy to manage those resources will be different than if all the inventory, materials, and supplies are purchased and delivered at the beginning of the project.

A common complaint of team members is that roles and responsibilities are not clearly defined on a project. Therefore, the definition of roles and responsibilities is a critical part of the Plan Resource Management process. Project work often includes more than just completing work packages. It may also include responsibilities such as assisting with risk, quality, and project management activities. Team members need to know what work packages and activities they are assigned to, when they are expected to report, what meetings they will be required to attend, and any other “work” they will be asked to do on the project. In a functional or matrix environment, the managers of team resources also need to understand when and for how long these resources will be needed on the project.

In terms of physical resources, the project manager needs to determine what is needed and where the resources will come from. If the resources are available from departments within the organization, the project manager must work with the managers of those departments to reach an agreement on delivery

dates as well as on quantity and quality of resources. If the resources will be obtained from external sources, the project manager must work with the procurement department, creating a purchase order or bid documents to facilitate the purchase. The project manager will likely be involved in the procurement process.

In the Plan Resource Management process, a project manager uses a variety of items, which are discussed in the following sections.

Project Charter PAGE 314 The project charter documents high-level requirements for the project. It may include a list of key stakeholders and preassigned resources, as well as budgetary constraints that must be considered when planning resource management.

Project Management Plan PAGE 314 The existing components of the project management plan are going to help you plan human resource management. Before you can define roles, responsibilities, reporting structure, and so forth, you'll need to consider information about the life cycle and processes already determined for the project, how work will be done, the communication needs of stakeholders, and other factors from the project management plan.

The scope baseline includes descriptions of the project deliverables, which helps the project manager determine the resources needed to create those deliverables.

The quality management plan includes the agreed-upon level of quality and grade of physical resources needed to satisfy the requirements of the project. These decisions will impact the team's options in terms of how and where they will obtain those resources.

The stakeholder engagement plan includes the approach to involving stakeholders—including the team. It provides direction for engaging stakeholders in the planning, decision-making, and work on the project. The stakeholder register lists the individuals and groups who are project stakeholders, and it includes analysis of factors such as each stakeholder's power and interest related to the project.

The procurement management plan describes how the project manager should interact with that department to facilitate the procurement of needed human or physical resources for the project.

Project Documents PAGE 314 Documents that can be used in planning resource management include requirements documentation, the project schedule, and the risk and stakeholder registers. These documents provide key information, such as the timeline for needed resources, what type of resources will be needed to complete project work, and how many resources will be required to get the work done.

Enterprise Environmental Factors PAGE 315 Before you develop a resource management plan, you need to understand what enterprise environmental factors may come into play. Remember that the term "enterprise environmental factors" refers to the company culture and existing systems the project will have to deal with or can make use of. For this process, you should take into account factors such as the following:

- What organizations will be involved in the project?
- Are there hidden agendas?
- Is there anyone who does not want the project?
- Are assigned and potential team members colocated or based in different offices and/or countries?
- What is the availability of contract help?
- What is the availability of training for project team members?

For most experienced project managers, this is common sense. They already consider such things on their projects, even if they have not called them enterprise environmental factors.

Organizational Process Assets PAGE 315 When developing the resource management plan, you may use organizational process assets such as a resource management plan template that describes the standard responsibilities on projects, and existing policies and procedures for resource management. These assets, along with historical information, such as lessons learned from similar projects, can help increase the efficiency of the Plan Resource Management process, as well as the effectiveness of the resulting plan.

Plan Resource Management Tools and Techniques A comprehensive resource management plan includes documentation of all project responsibilities and assignments on the project. There are a lot of methods that can be used to document and communicate roles and responsibilities of management, team members, and other stakeholders. Examples include a responsibility assignment matrix (RAM), a RACI chart, an organizational breakdown structure, a resource breakdown structure (RBS), the WBS, and written position descriptions. Additional tools and techniques used in the plan resource management process include physical resource documentation and organizational theory.

Any roles and responsibilities that are expected of team members, such as project management team assignments, reporting requirements, or meeting attendance, need to be clearly assigned, in addition to the project activities the team members are expected to complete. In other words, all efforts the project team might expend should be determined in advance. If you work on small projects, you might never have taken the time to do this. Spend a moment now thinking about how much time this effort might take on a large project.

For the exam, know the tools presented in the following sections, including the information each tool displays so that you can answer questions such as the following:

Question A responsibility assignment matrix does not show _____.

Answer When people will do their jobs (time)

Responsibility Assignment Matrix (RAM)¹ This chart cross-references team members with the activities or work packages they are to accomplish. Figure 9.2 is an example of a RAM.

		Team Member			
		Karla	Patrick	Muhammad	Trisha
Activity	A	P		S	
	B		S		P

Key: P = Primary responsibility, S = Secondary responsibility

FIGURE 9.2 Responsibility assignment matrix

RACI Chart² (Responsible, Accountable, Consult, and Inform) This chart is a type of responsibility assignment matrix that defines role assignments more clearly than the example shown in figure 9.2. Instead of the P and S shown in the figure, the letters R for Responsible, A for Accountable, C for Consult, and I for Inform are used. Note that multiple resources may be responsible, informed, or consulted, but only one person is held accountable.

Organizational Breakdown Structure³ An organizational breakdown structure can be used to assign project responsibilities to divisions or departments within the organization, such as marketing, product development, or IT. In a matrix organization, the project manager will have to interface with the managers of each department involved in the project to coordinate availability and scheduling of human and physical resources that will be used on the project. Figure 9.3 is an example of an organizational breakdown structure.

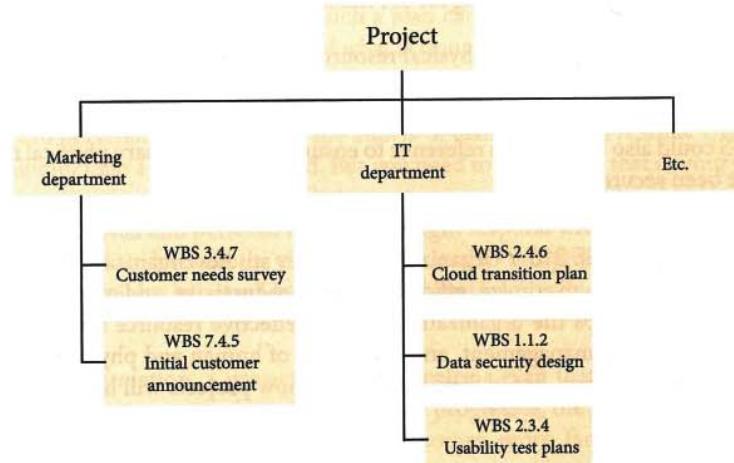


FIGURE 9.3 *Organizational breakdown structure*

Resource Breakdown Structure⁴ The resource breakdown structure breaks the work down by type of resource (see fig. 9.4).

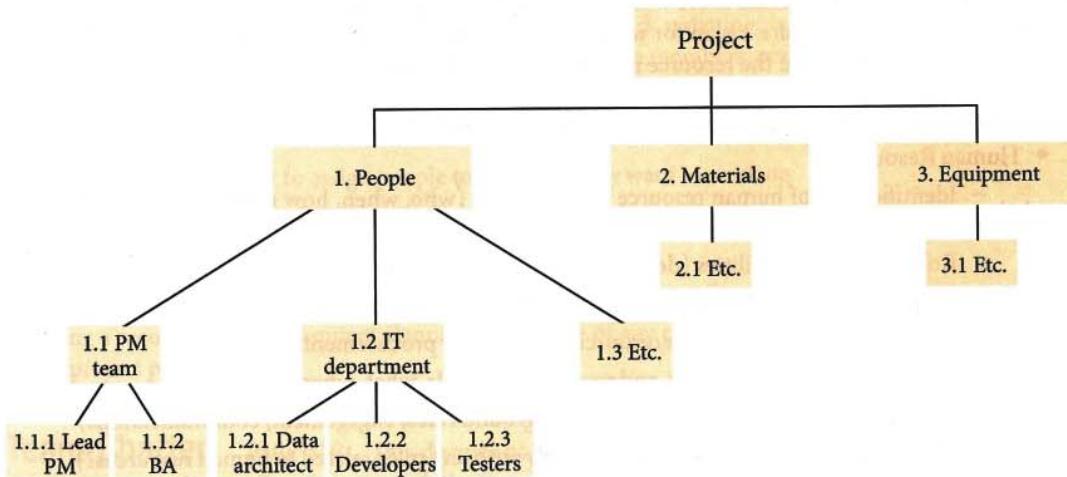


FIGURE 9.4 *Resource breakdown structure*

Work Breakdown Structure Are you surprised to see the WBS here? Can you think of how the WBS could be a valuable tool in creating the resource management plan? In the Scope Management chapter, we said that all project work must be represented in the WBS. It follows, then, that the WBS is a great tool to ensure that each work package has an “owner”—a team member responsible to complete that work.

Position Descriptions Position descriptions are usually documented in text format rather than charts. If you haven't used these on your projects, imagine a typical job description, but created only for project work.

Physical Resource Documentation In addition to mapping out the roles and responsibilities of human resources on the project, the project manager must plan ahead for usage of physical resources. This aspect of planning is as important as planning for the management of human resources!

The project manager must document the physical resource needs, which may involve adapting tools and techniques often used for other purposes. For example, since the WBS shows the project deliverables broken down into work packages, it could be used to plan resource requirements for each of those work packages. The WBS could also be used as a reference to ensure that all necessary physical resources for each work package have been secured.

Organizational Theory PAGE 318 Organizational theory studies organizations to identify how they solve problems and how they maximize efficiency and productivity and meet the expectations of stakeholders. Such analysis helps the organization develop effective resource management policies and procedures for the acquisition, management, and evaluation of human and physical resources. Adopting practices such as JIT, Lean, Kaizen, or Six Sigma influences how projects will handle the management of physical resources.

The outputs of the plan resource management process are discussed in the following sections.

Resource Management Plan PAGE 318 The primary result (output) of the Plan Resource Management process is, of course, a resource management plan. If you manage small projects, think for a moment about what the resource management effort would involve on a large project that has hundreds of assigned resources. Would it take more work than you are doing now to manage all the resources on your project? Large projects require a plan for when and how resources will be added, managed, and released from the project. This is what the resource management plan provides.

Components of the resource management plan include the following:

- Human Resources
 - Identification of human resource requirements (who, when, how many, what skills, what level of expertise, duration)
 - Roles and responsibilities (described earlier in this chapter)
 - Project organizational charts (described earlier in this chapter)
 - Process for acquiring human resources (internal or procurement)
 - Training, team development, and recognition (goals, what, when)
 - Project team management (team charter, ground rules, engagement, communications)
 - Compliance (How will the project comply with any rules related to human resources?)
 - Safety (policies to protect the resources)
 - Release of human resources
- Physical Resources
 - Identification of physical resource requirements (what, when, how many, what type, quality, grade, duration)
 - Process for acquiring physical resources (internal or procurement)
 - Inventory management
 - Release of resources

A project manager must motivate their team, especially when working on a project in a matrix organization. Have you ever wondered, "How do I get improved performance from people who do not report directly to me in the organization?" If your team members are not motivated, it is nearly impossible to be effective as a project manager. This is not to say that great project managers do not have issues with motivating people, but they have the tools and knowledge to prevent and to deal with such problems. Recognizing individual and team accomplishments is one of the most effective ways to motivate and gain cooperation from your team, regardless of the reporting relationship. Excellent project managers include a plan to do so as part of their resource management plan. Developing such a plan can be a significant effort, as it should include when and how resources will be recognized, and what actions or achievements will be rewarded.

Everyone likes to feel appreciated. A good start to planning how to use recognition and rewards⁵ is to make a conscious effort to personally acknowledge the efforts of team members. A smile and a "thank you" are often more meaningful than a so-called reward. But you need to go beyond that in your planning. To make the rewards more personal, consider asking what your team members and stakeholders want to get out of the project, on a professional and personal level. They might respond with such things as, "I want to learn more about XYZ," "I want to decrease the time I am allocated to this project," "I want to make sure I leave work on time on Tuesday nights because I have a family obligation," or "I want to be assigned a certain piece of the project work."

After gathering such information, a project manager creates a plan that includes what recognition and rewards will be given, to whom, and when. As the project progresses, the plan may be iterated as new team members are added, and as the project manager becomes more familiar with the team and what motivates them.

Recognizing and rewarding the team might include performing the following actions on an ongoing basis, while project work is being done:

- Saying "thank you" more often
- Awarding prizes for performance
- Recommending team members for raises or choice of work assignments, even though such actions by the project manager may not officially be part of the team members' performance reviews
- Sending notes about great performance to team members' managers
- Planning milestone parties or other celebrations
- Adjusting the project to assign people to activities they want to work on
- Assigning a team member to a non-critical-path activity so that they can gain more knowledge in that area

The list could go on and on, but ask yourself, "Do I do any of these things? Do I do them systematically?" Creating a recognition plan requires planning in advance of any project work, and then iterating that plan as the project progresses.

Team Charter PAGE 319 This document is a working agreement developed by the members of the project team. It describes the approach the team will take regarding communications, decision-making, and conflict resolution, as well as ground rules for team meetings. The team charter is a project document and can be referenced at any time during the project.

Setting ground rules can help eliminate conflicts or problems with the team during the project because everyone knows what is expected of them. And if team members have input on the creation of the ground rules, they're more likely to follow them. Ground rules can be especially important when the team is managed virtually.

The ground rules may include items such as the following:

- How a team member should resolve a conflict with another team member
- When a team member should notify the project manager that they are having difficulty with an activity
- Rules for meetings
- Who is authorized to give direction to contractors
- How the team will decide work assignments
- When and how to provide status updates to the project manager
- Methods for coordinating and approving changes to team members' calendars, both in normal and emergency situations

Project Document Updates PAGE 320 The assumption log is updated to reflect assumptions made in planning regarding resources. These may include assumptions made about the availability, quantity, quality, or type of human and/or physical resources. Other assumptions made might relate to what type of rewards and recognition will be effective, and how the releasing of resources should be managed. Assumptions can change as the project progresses, and should be regularly assessed for validity. Incorrect assumptions may create risks on the project.

Another document that may need to be updated is the risk register. Risks related to resources should be added to the risk register, and then analyzed and prioritized along with other documented risks in the risk management process.

Estimate Activity Resources PAGE 320

Process Estimate Activity Resources
Process Group Planning
Knowledge Area Resource Management

In the Estimate Activity Resources process, the project manager and team determine the type and quantity of all resources needed to complete project work. This includes human resources to perform the work packages that were created in the WBS and broken down in the activity list. It also includes any equipment or materials needed, space in which to meet and perform project work, and anything else needed to fulfill the requirements of the project.

The resource management plan is an input to all the processes (with the exception of Plan Resource Management) within Resource Management. Here, it provides documentation on the estimating methods to be used. Other inputs include the scope baseline (the project scope description, WBS, and WBS dictionary), and the activity list from Schedule Management. These enable estimating needed resources at the work package level and activity level, respectively, and are important elements to creating accurate estimates. Another input from Schedule Management is activity attributes. Attributes provide specific information about each activity, such as the type and amount of human and physical resources expected to be required to complete them.

Cost estimates provide constraints in terms of resource estimating, as the resource costs must fall within the cost baseline. Resource calendars identify organizational work hours and company holidays, and show the availability of potential resources—both human and physical. Organizational process assets include policies the project must follow when arranging for staff and needed equipment.

In the Schedule and Cost Management chapters, we discussed estimating techniques used to develop the schedule and budget. Several of those techniques may also be used to estimate activity resources. Let's briefly review them:

- **Bottom-up estimating** This technique involves creating detailed estimates for each part of an activity or work package and then rolling the estimates into work packages and control accounts and, finally, into an overall project estimate.
- **Analogous estimating** Analogous estimating uses expert judgment and historical information to predict the future.
- **Parametric estimating** Parametric estimating creates an equation that uses historical information from other estimates, actual results, and variables—such as the number of hours to complete the work or the number of resources with the associated skill level, quality, or grade—to create estimates.
- **Alternatives analysis** Bottom-up, analogous, and parametric estimating can be used to generate estimates for various options—such as the costs to make versus buy software for a project, the costs of internal versus external team members, or the impact of using various materials to produce components of the product of the project. Alternatives analysis can then be used to assess the impact of each option on project constraints such as schedule, cost, quality, and risk.

Another tool you can use to estimate resources is a resource histogram. A resource histogram is a way to visualize resource requirements, and compare needed resources and their availability, to better enable estimating. As depicted in figure 9.5, a resource histogram is a bar chart that shows the number of resources needed per time period; it also illustrates where there is a spike in the need for resources. If the materials, equipment, or human resources are not available when they are needed, the project manager must evaluate available options, which may include negotiating with another department to provide the resources, procuring the resources from an external source, or adjusting the project schedule to do the work when the resources are available.

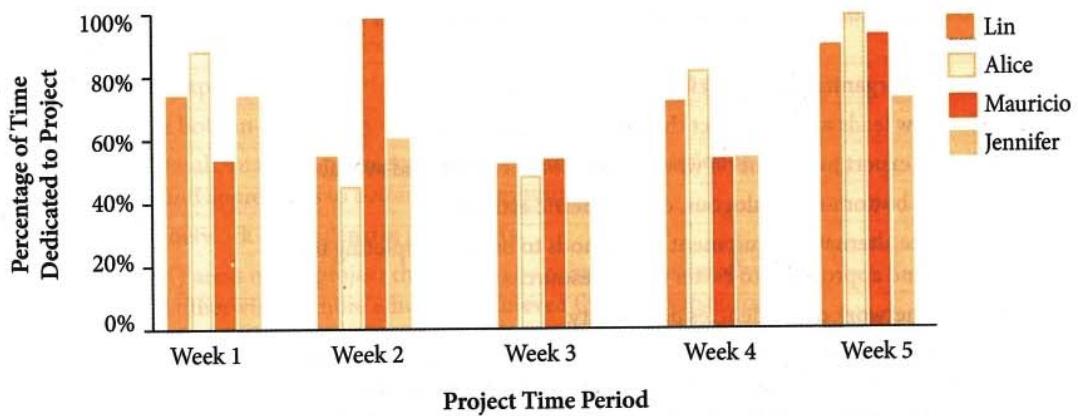


FIGURE 9.5 Resource histogram

Do you remember the discussion of resource leveling in the Schedule Management chapter? It is a technique to change the project to minimize the peaks and valleys of resource usage (level the resources). The project manager could use a histogram to help in performing that activity if resources are limited.

At the end of this process, the team will have determined resource requirements for project activities, including the cost, quantity, and availability of human and physical resources. They may choose to document the requirements in a resource breakdown structure. You may remember that the RBS was also discussed as a Plan Resource Management tool that is used to break down the work by the type of resource required. As planning continues, and more detail is gathered, the RBS is expanded and augmented in Estimate Activity Resources. The RBS in this process is an iteration of the document that was originally created in Plan Resource Management.

Exercise In the following table, identify which activities are involved in the Estimate Activity Resources process. Simply write yes or no in the right-hand column. Then check your answers against the answer table. (As you complete this exercise, assume the full project management process is being used on a large project.)

Action	Is It Part of Estimate Activity Resources?
1 Review project management plan.	
2 Review scope baseline.	
3 Review resource availability.	
4 Review cost estimates.	
5 Get one time estimate per activity.	
6 Complete an analysis of the reserves needed on the project.	
7 Create a company calendar identifying working and nonworking days.	
8 Create milestones.	
9 Review the WBS, activity list, and activity attributes.	
10 Review the risk register and assumption log.	
11 Identify potentially available resources and their skill levels.	
12 Review historical information about the use of resources on similar projects.	
13 Review organizational policies on resource use.	
14 See how leads and lags affect the time estimate.	
15 Solicit expert judgment on what resources are needed and available.	
16 Create bottom-up, analogous, or parametric estimates.	
17 Analyze alternative equipment or methods to use in completing the work and approaches to better utilize resources.	
18 Show network dependencies per activity.	
19 Identify areas of the project that cannot be completed internally or would otherwise be more efficiently achieved through outsourcing. This information will be shared with the procurement department.	
20 Crash the project.	
21 Break the activity down further if the activity is too complex to estimate resources (bottom-up estimating).	
22 Quantify resource requirements by activity.	
23 Create a hierarchical image that organizes the planned resources by their category and type (a resource breakdown structure).	
24 Fast track the project.	
25 Develop the schedule.	
26 Develop a plan as to what types of resources will be used.	
27 Update project documents.	

Answer

Action	Is It Part of Estimate Activity Resources?
1 Review project management plan.	Yes
2 Review scope baseline.	Yes
3 Review resource availability.	Yes
4 Review cost estimates.	Yes
5 Get one time estimate per activity.	No
6 Complete an analysis of the reserves needed on the project.	No
7 Create a company calendar identifying working and nonworking days.	No
8 Create milestones.	No
9 Review the WBS, activity list, and activity attributes.	Yes
10 Review the risk register and assumption log.	Yes
11 Identify potentially available resources and their skill levels.	Yes
12 Review historical information about the use of resources on similar projects.	Yes
13 Review organizational policies on resource use.	Yes
14 See how leads and lags affect the time estimate.	No
15 Solicit expert judgment on what resources are needed and available.	Yes
16 Create bottom-up, analogous, or parametric estimates.	Yes
17 Analyze alternative equipment or methods to use in completing the work and approaches to better utilize resources.	Yes
18 Show network dependencies per activity.	No
19 Identify areas of the project that cannot be completed internally or would otherwise be more efficiently achieved through outsourcing. This information will be shared with the procurement department.	Yes
20 Crash the project.	No
21 Break the activity down further if the activity is too complex to estimate resources (bottom-up estimating).	Yes
22 Quantify resource requirements by activity.	Yes
23 Create a hierarchical image that organizes the planned resources by their category and type (a resource breakdown structure).	Yes
24 Fast track the project.	No
25 Develop the schedule.	No
26 Develop a plan as to what types of resources will be used.	Yes
27 Update project documents.	Yes

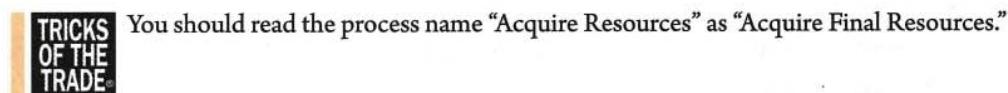
Acquire Resources PAGE 328

Process Acquire Resources
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This process involves following the resource management plan to secure the human and physical resources needed for the project.

The resource management plan describes how resources will be acquired and released, and the resource requirements documentation tells the project manager what types of resources are needed. The project schedule and cost baseline provide essential information regarding when resources will be required and the amount of funds budgeted to pay for them.

To understand why this is an executing process, think of a large project that may last several years and require hundreds of people and lots of physical resources. A planning team is acquired early in planning to help the project manager. However, many of the people and other resources needed to do the work may not be needed until long after planning starts. The final list of resources might include contractors, sellers, and people who will work on the project years into the future and may not even be employed by the company until needed. Likewise, the physical resources may be purchased closer to the time they are needed, to avoid the need to warehouse inventory. Acquiring the planned resources as they are needed is an example of rolling wave planning.



You should read the process name "Acquire Resources" as "Acquire Final Resources."

Acquiring resources begins by using the planning and estimating work, which identified the type and quantity of resources needed. Let's look first at the process of acquiring the team, and then at acquiring physical resources.

When it is time to finalize the human resources who will perform the work of the project, the project manager may be required to negotiate with functional (resource) managers, other project managers, and the resources themselves in order to arrange their participation on the project. If the resources must be hired or contracted, work with the human resource or procurement departments may be necessary.

The project manager will also use the resource requirements documentation as a reference in acquiring physical resources. Often this involves working with the procurement or inventory management department.

A project manager has to work with the resources they are given, or acquire those that are needed. Resource availability (as indicated by resource calendars) and the project schedule must be coordinated to ensure that the right resources will be available when they are required.

To review, acquiring project resources includes all the following:

- Knowing which resources are preassigned to the project and confirming their availability
- Negotiating for the best possible resources
- Hiring new employees
- Hiring resources through the contracting process from outside the performing organization—outsourcing
- Using JIT, Lean, or other methods as required by the organization
- Managing the risk of resources becoming unavailable

Types of Teams The makeup of the final project team can take one or a combination of forms, such as the following:

- **Dedicated** Most of the team members work full-time and exclusively on the project. From the perspective of the project manager, this is the easiest form of team to work with, as team members can dedicate most of their energy to the project and often report directly to the project manager. Dedicated teams are most common in projectized organizations, but can also be found in matrix organizations; they're least likely to exist in functional organizations.
- **Part-time** Team members and the project manager spend a portion of their time working on the project while also working on other projects and/or their usual (non-project-related) work responsibilities. Part-time teams are most often seen in functional and matrix organizations.
- **Partnership** In cases where several organizations undertake a project, the teams are likely to consist of people from each of the participating organizations, plus the project manager from the organization taking the lead on the project. Such teams may offer advantages, such as cost savings, but they can be difficult to manage.
- **Virtual** When multiple organizations, offices, groups, or individuals are involved on a project, the geographic distance of these organizations can necessitate the creation of virtual teams (see the "Virtual Teams" section of this chapter).

For the exam, be aware of how the type of team described in a situational question could impact the project manager's work. For example, with a dedicated team, the project manager will have more control over the team members. With a part-time team, the project manager will likely have to negotiate with functional managers and leadership to acquire and retain team members. With a partnership or virtual team, coordination among the various organizations or locations might require increased risk management work, more effort to coordinate communication, and so on.

Let's review several of the ways a project manager may obtain resources.

Preassignment As noted earlier, sometimes resources are assigned before the project begins. Preassigned resources are documented in the project charter. This relates to both physical and team resources.

Negotiation When resources are not preassigned, they may be acquired through negotiation. You will see negotiation referenced frequently on the exam as it relates to gaining resources from within your organization and in procurement situations. To negotiate for human or physical resources from within the organization, the project manager should do the following:

- Know the needs of the project and its priority within the organization.
- Be able to express how the resource's manager will benefit from assisting the project manager.
- Understand that the resource's manager has their own work to do and that the individual may not gain benefits from supporting the project.
- Do not ask for the best resources if the project does not need them.
- Be able to prove, using project management tools such as the network diagram and project schedule, why the project requires the stated quantity and quality of resources.
- Use negotiation as an opportunity to discover what the resource's manager will need from the project manager in order to manage their own resources.
- Build a relationship so the project manager can call on the expertise of the resource's manager later in the project if necessary.
- Work with the resource's manager to deal with situations as they arise.

Notice the previous list goes beyond traditional negotiation strategy and includes elements of professional responsibility. Although chapter 14 focuses on professional and social responsibility, the topic is discussed throughout this book and is relevant in every part of a project manager's job.

When resources must be acquired from outside the organization from external vendors, suppliers, or contractors, the project manager is required to follow procurement and negotiating policies and procedures for the acquisition of resources. (See the Procurement Management chapter for information related to procuring resources from outside sources.)

Virtual Teams Not all teams meet face-to-face. Virtual teams have to rely on other forms of communication to work together. Although virtual teams can be more challenging to manage because of communication issues and differences in schedules, languages, and/or culture, they offer the opportunity to benefit from the expertise of team members who are in distant locations or who are otherwise unavailable to participate with the team onsite. There may be questions on the exam that ask why virtual teams might be necessary as well as some that describe situations that involve acquiring and managing virtual teams. You may also encounter situational questions for which choosing the correct answer depends on your understanding that a virtual team might require a different approach than a colocated team.

Multicriteria Decision Analysis When acquiring resources, the project manager may establish a set of criteria to help choose potential team members or physical resources. Factors that address the needs of the project, such as availability, cost, experience, location, and/or a required skill set, are weighted by importance, and potential resources are evaluated based on the selected criteria.

A potential issue to be aware of when dealing with team members is something called the “halo effect,”⁶ which refers to a tendency to rate team members high or low on all factors due to the impression of a high or low rating on one specific factor. Because of the halo effect, a project manager might say to a team member, “You are a great programmer. Therefore, we will make you a leader of a team within the project and expect you to be great at that as well.” Since a person who is a great programmer may not, in fact, be qualified to be a team leader, such assumptions can have a negative impact on the project schedule, cost, and quality, and should be avoided.

Outputs of Acquire Resources The outputs of the Acquire Resources process include physical resource assignments, project or work assignments, and resource calendars that show the planned utilization and availability of project resources. Here are some things to remember about the outputs of this process:

- If decisions made in this process require changes to approved management plans or project documents, change requests are submitted to integrated change control. Affected documents and plans may include any of the plans or baselines within the project management plan.
- The resource management plan may be changed based on the project experience to date. For example, the plan for acquiring future resources may need to be adjusted if it doesn't work as expected.
- The project schedule may need to be adjusted to accommodate the availability of resources with specific expertise needed by the project. The cost baseline may be impacted if hourly rates or material prices will need adjustment from what was estimated.
- Project documents will need to be updated or changed, with new team members added or information changed in the stakeholder register. The resource breakdown structure is iterated to include specific information about human or physical resources that have been committed to the project.
- Newly identified risks related to human and physical resources are added to the risk register, reviewed, and analyzed. For example, a resource with unique qualifications could be called away during the

project, or the equipment purchased or rented may have a higher failure rate than anticipated. Resource requirements, including the type, quantity, skill level, or quality and grade may change.

- There are usually lessons learned to be captured, integrated into the project for future acquisitions, and shared with the organization.

Develop Team PAGE 336

Process Develop Team
Process Group Executing
Knowledge Area Resource Management

The Develop Team process is ongoing throughout project work. This process should result in decreased turnover, enhanced individual knowledge and skills, and improved teamwork. The project manager works to lead, empower, and motivate the team to achieve high performance and to meet project objectives. This is accomplished through efforts to create an environment conducive to building trust and cooperation, and by providing training and support to the team. Team members are recognized for their efforts.

A plan for making all of this happen is included in the resource management plan. The project manager can also make use of lessons learned earlier in the project and on other, similar projects to enhance their ability to effectively develop the team.

Exercise What do you think a project manager needs to do to develop a team?

Answer An exercise like this can be tempting to skip. But remember that the only effective way to find gaps in your knowledge is to test your knowledge and understanding of the goals, actions, and benefits of the process before you look at the answers.

You may do some of the activities listed below on your projects, but you might not plan them in or do them consistently or consciously. These activities are part of proper project management. Keep them in mind for the exam to help you understand the situations described and select the best answer choices. Remember to assume that proper project management was done—unless the exam situation indicates otherwise.

A major part of being a project manager is ensuring the project team is working together as effectively and efficiently as possible. Your answer could include any of the following:

- Using soft skills, such as mentoring, leadership, negotiation, empathy, and communication
- Encouraging teamwork
- Communicating honestly, effectively, and in a timely manner with the people assigned to your team
- Assessing team members' strengths and weaknesses, preferences, and learning styles to help the team work together
- Establishing and maintaining trust between the project manager and each team member, and among all stakeholders
- Collaborating with the team to make good, bought-into decisions and to find mutually beneficial solutions to problems
- Capitalizing on cultural differences
- Holding team-building activities
- Providing training for team members as needed
- Encouraging team members to uphold the agreements documented in the team charter
- Assisting the team with conflict resolution when needed
- Giving recognition and rewards
- Placing team members in the same location, if possible (colocation)
- Facilitating communication between team members
- Evaluating and working to improve team performance
- Motivating team members
- Improving team members' knowledge
- Encouraging a positive team culture

Remember that on a properly managed project, team members need to have input into the project, including what work needs to be done, when, at what cost, what the risks may be, etc.—no matter when they get involved in the project. Great project managers will invite new team members to review their part of the project for changes before they start work. People perform better when they have input, rather than simply being told what to do.

Interpersonal and Team Skills PAGE 341

Motivation Theory⁷ Since most projects operate in a matrix environment, the team members often do not report directly to the project manager. To gain the cooperation of team members, the project manager must understand how to motivate them.

As you have read in this chapter, one of the best ways to gain cooperation is to give rewards. How can we reward people if we do not understand what motivates them? Questions on the exam related to this topic do not directly quote motivation theorists. The questions may simply describe situations and ask you what to do. The answer might depend on understanding that the person in the situation is a Theory X manager, or that the project manager was using an ineffective motivation technique.

Following are explanations of four motivation theories that you can help you understand situations for the exam.

McGregor's Theory of X and Y⁸ McGregor believed that all workers fit into one of two groups: X and Y. The exam may describe this concept in many different ways. It can be confusing to determine which answer is correct or even what the choices are saying. For those of you with strong visual memories, here is a trick to answering questions on these theories.

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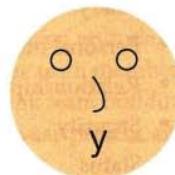
Theory X Based on the picture, take a guess as to what Theory X is.

Answer Managers who accept this theory believe that people need to be watched every minute. They believe employees are incapable, avoid responsibility, and avoid work whenever possible.



Theory Y Based on the picture, take a guess as to what Theory Y is.

Answer Managers who accept this theory believe that people are willing to work without supervision, and want to achieve. They believe employees can direct their own efforts. It's a PMI-ism that this is indeed how team members behave, so unless directed otherwise, assume this perspective when responding to exam questions.



Maslow's Hierarchy of Needs⁹ Maslow's message is that people are not most motivated to work by security or money. Instead, the highest motivation for most people is to contribute and to use their skills. Maslow called this "self-actualization." He created a hierarchy of needs to explain how people are motivated and stated that a person cannot ascend to the next level until the levels below are fulfilled. See figure 9.6.

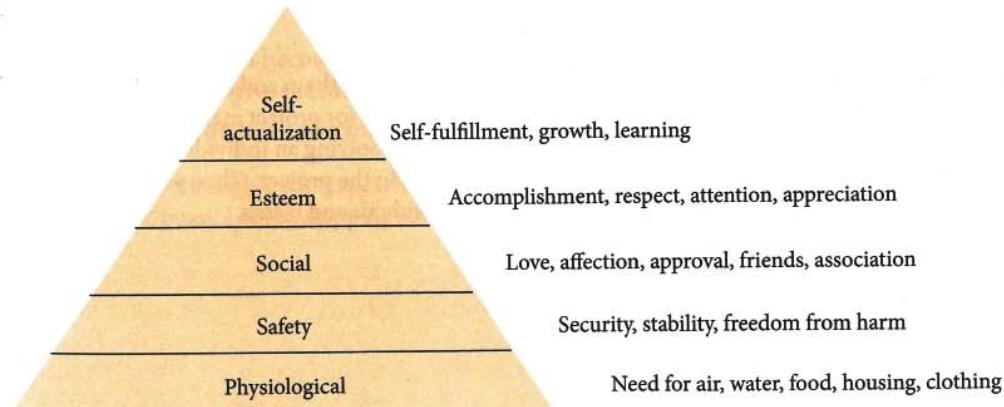


FIGURE 9.6 A representation of Maslow's hierarchy of needs

McClelland's Theory of Needs¹⁰ (or Acquired Needs Theory) This theory states that people are most motivated by one of three needs. A person falling into one need category would be managed differently than a person falling into another category. The following table explains the three need categories.

Primary Need	Behavioral Style
Achievement	These people should be given projects that are challenging but are reachable. They like recognition.
Affiliation	These people work best when cooperating with others. They seek approval rather than recognition.
Power	People whose need for power is socially oriented, rather than personally oriented, are effective leaders and should be allowed to manage others. These people like to organize and influence others.

Herzberg's Two-Factor Theory of Motivation¹¹ Herzberg's theory deals with hygiene factors and motivating agents.

Hygiene Factors Poor hygiene factors may destroy motivation, but improving them, under most circumstances, will not improve motivation. Hygiene factors are not sufficient to motivate people.

Examples of hygiene factors include the following:

- Working conditions
- Salary
- Personal life
- Relationships at work
- Security
- Status

Motivating Agents People are motivated, energized, and engaged by the work itself, including factors such as the following:

- Responsibility
- Self-actualization
- Professional growth
- Recognition

So, the lesson here is that motivating people is best done by rewarding them and letting them grow. Giving raises is not the most effective motivator. This is generally good news for project managers, as they often do not have any influence over the pay raises of their team members. Solving an individual or team issue may mean that you have to make certain that basic needs are met within the project. Then you can use rewards, recognition, and the roles and responsibilities assigned to individuals and teams.

Team Building Team building can play a major role in team development—helping to form the project team into a cohesive group working for the best interests of the project and enhancing project performance. Make sure you know the following key points about team building:

- It is the project manager's job to guide, manage, and improve the interactions of team members.
- The project manager should work to improve trust and cohesiveness among the team members.
- The project manager should incorporate team-building activities into project activities.
- Team building requires a concerted effort and continued attention throughout the life of the project.
- WBS creation is a team-building activity because it allows team members to actively engage in the planning and ownership of the project; similar benefits occur when the team is involved in other planning efforts, as well.
- Team building should start early in the life of the project.

Let's spend a little more time on the concept of trust. First think of project problems you have recently experienced. Now ask yourself the following questions: "Could these problems be caused by a lack of trust? Do team members trust each other? Do they trust me?" Your team needs to feel that you are working in the best interests of the project, the company, and them—rather than in your own best interests. Trust is gained or lost from the minute you meet each team member for the first time. If the team does not trust you, you cannot easily be successful. The team will not take your direction or follow your instructions, and the project will suffer. Once you have trust, it can be lost if you are not honest and consistent. Assuming you work in a matrix organization, how do you get people to cooperate if you do not have the ability to give them a raise or a promotion? Trust, as well as a recognition and reward system, are the answers.

Trust also affects, and is affected by, your reputation. Do you know what your reputation is? Many of the people you meet know. Why not ask them about it, so you can deal with any changes you need to make?

Team building helps build trust, and it is a concept that appears throughout the exam. It is an attitude, as well as an action. Do you have the attitude of helping to build the team, or do you think the team members should just follow instructions and accept what they are told? Some project managers think team building is a minor activity; they bring in lunch for the team a couple times during their three-year project and believe they have done team building.

Team building, like many parts of project management, is, in part, a science. The Tuckman ladder model formally identifies the following stages of team formation and development:¹²

- **Forming** People are brought together as a team.
- **Storming** There are disagreements as people learn to work together.
- **Norming** Team members begin to build good working relationships and learn to trust the project manager and each other.
- **Performing** The team becomes efficient and works effectively together. This is the point when the project manager can give the most attention to developing individual team members.
- **Adjourning** The project ends, and the team is disbanded.

New teams may go through each step, while teams that have worked together before may experience a shortened version, possibly even skipping some of the early steps.

Resource Management NINE

Project managers who feel they do not have time for team building typically are not using project management best practices on their projects. Practices such as properly planning a project and managing risks and quality save significant amounts of time on a project, freeing up the project manager to do other important things, like team-building activities. When you take the exam, assume the project manager featured in the questions has a team-building plan appropriate to the size and characteristics of the team.

Team-building activities can include the following:

- Involving team members in planning the project, including creating the WBS as a group
- Taking classes together
- Retrospectives by the team to evaluate and improve their processes and interactions
- Collaborative problem-solving
- Milestone parties
- Holiday and birthday celebrations
- Skills assessments and development

Negotiation Negotiation can provide value in developing the team, while working to build consensus on project decisions. Including the team members in the decision-making process shows that the project manager values and considers their input.

Conflict Management On any project, there may be conflicts among team members or between team members and the project manager. This is especially true as a team is moving through the forming and storming stages of development on the Tuckman ladder, discussed previously. It is a responsibility of the project manager to address such conflicts, and facilitate resolution in a way that satisfies everyone involved. We will further discuss conflict management in the “Manage Team” section.

Influencing “Influencing” is a rather ambiguous term, but it is an important aspect of a project manager’s role that begins with the project manager actively listening to differing viewpoints expressed by team members. Acknowledging those different perspectives and using communication and persuasive skills helps the project manager develop mutual trust and, eventually, agreement within the team.

Individual and Team Assessments PAGE 342

Individual Assessments The more you know about each person on the project team, the easier it is to build trust, improve team communication, and encourage cooperation among team members. Personnel assessment tools can help you learn more about team members by revealing how they make decisions, interact with others, and process information. This information can give you insight into how to lead and guide the team. Formal and informal assessment of team members by the project manager should continue throughout the project.

Team Assessments The project manager completes formal and informal team performance assessments as part of developing the project team. These assessments are meant to evaluate and enhance the effectiveness of the team as a whole. They may include an analysis of how much team members’ skills have improved over the course of the project; how well the team is performing, interacting, and dealing with conflict; and how they are progressing through the stages of team development. The assessments also help identify needed support or intervention by the project manager. Such assessments should be ongoing while project work is being done. The results of team assessments can be used to recognize the team’s progress or to motivate them to improve. Think of team performance assessment as looking at team

effectiveness. The results of these assessments are also inputs to the Manage Team process, in which the project manager uses them to address issues identified.

Training PAGE 342 Team members may require training to perform on the project or to enhance their performance. Such training can help team members, while also decreasing the overall project cost and schedule through increased efficiency. If the training will benefit the organization in the long run and/or can be used on future projects, it may be covered as an organizational cost. Otherwise, it is paid for by the project and documented in the resource management plan and included in the project budget.

Project Performance Appraisals On the exam, you may also see a mention of project performance appraisals, which are evaluations of individual team member performance. In this effort, the project manager collects information from team members' supervisors (often members of the project management team) and adjusts the project accordingly. For example, the project manager might decide, as a result of an appraisal, to provide some kind of reward to recognize a team member's diligence. On the other hand, an appraisal might bring to the project manager's attention the need to provide additional training or encouragement to a team member. Note that the focus of this appraisal is on the individual's performance of their assigned responsibilities, rather than on team performance.

Because the Develop Team and Manage Team processes are performed at the same time, it is sometimes difficult to determine what happens in which process. It is our interpretation that project performance appraisals are actually performed as part of Manage Team, and the rewards and additional training indicated by the results of those appraisals are given as part of Develop Team.

Colocation¹³ PAGE 340 A project manager might try to arrange for the entire team in each city to have offices together in one place or one room. This is called colocation, and it helps improve communication, decreases the impact of conflict (since all parties are right there), and improves project identity for the project team and for management in a matrix organization. The project charter, WBS, network diagram, and schedule may be posted on the walls to keep everyone focused on the work of the project.

Virtual Teams PAGE 340 The efforts of the project manager to develop the team have an added level of complexity when the team is not colocated. Extra efforts will be required to keep everyone on a virtual team informed, engaged, and committed to the project work. Such efforts include an emphasis on communication.

Communications Technology PAGE 340 Technology provides many ways to keep in touch during a project, including the following:

- A shared portal, such as a website, enables access to current project documents at any time and from any location.
- Video or audio conferencing can be used to conduct virtual meetings when team members are working from remote locations.
- Email, text, and online chat are familiar ways for the project manager and team to communicate.

Communications technology is a valuable asset on any project, but particularly on virtual projects. The project manager can use technology to build and support team efforts, even among team members who may not ever have the opportunity to work in the same physical location. Of course, communications technology also helps colocated team members stay in contact with each other and provide timely updates to other team members as needed. The resource management plan includes specifics of how the project manager will use available communications technology to meet the development needs of the team.

Recognition and Rewards PAGE 341 In the Develop Team process, the project manager appraises performance and provides recognition and rewards in response to the work of the team or individual team members. To be effective, such rewards should be determined based on the project manager's understanding of what is valuable to the team member or group being recognized. In addition to recognizing past accomplishments, rewards provide incentive for ongoing achievement and efforts.

Outputs of Develop Team The results of team performance assessments are an output of this process. As you will read in the next section, these results are an input to the Manage Team process, and they provide insight to the project manager regarding continuous improvement of the team's performance. If the project manager determines that changes to any of the project plans are necessary, change requests are processed through integrated change control. Project documents including the project schedule, team assignments, and resource calendars may require such formal changes.

Organizational process assets updates may include changes to training requirements, newly adopted team-building exercises, and revisions to existing templates for individual and team assessments. This process may also result in updates to documents such as the team charter and lessons learned register.

Manage Team PAGE 345

Process Manage Team
Process Group Executing
Knowledge Area Resource Management

Like the Develop Team process, the Manage Team process is done during project executing. The Develop Team and Manage Team processes are performed simultaneously throughout the project.

Manage Team involves all the day-to-day management activities that you are likely already doing on your projects. But there may be more to managing a team than you realize. Not knowing the responsibilities of a project manager as described in this chapter could cause you to get questions wrong on the exam.

Inputs to Manage Team PAGE 347 Details related to team-management activities are included in the resource management plan. Other inputs to this process include the issue log (specifically issues related to the team), project team assignments (documented in a RACI chart), and the team charter. Work performance reports provide an indication of project progress as compared to the project management plan. The project manager uses this information to identify necessary corrective actions. Results of team performance assessments from the Develop Team process are analyzed to identify successes that need to be recognized, areas in which the team may need additional support or assistance, and issues or conflicts that need to be resolved in this process. Ultimately, team members are released as their work is completed.

In the Manage Team process, the project manager should perform the following activities to help challenge team members to be part of a high performing team:

- Tracking and evaluating team performance
- Providing leadership
- Dealing with team issues
- Facilitating conflict resolution
- Negotiating and influencing
- Adjusting plans based on performance data
- Managing risks to team success
- Observing what is happening

- Using an issue log to track resolution
- Actively looking for and helping to resolve conflicts that team members cannot resolve on their own

Part of supporting a high-performing team is assessing how each team member is fulfilling their responsibilities. Project performance appraisals provide this information on individual team members.

Every project is different and presents unique challenges to the project manager. Factors such as the size and makeup of the team, the experience level of the team, and the complexity of the actual project work must be considered by the project manager in their efforts to get the best from the team.

Consider the following question:

Question You were just assigned to take over a project from another project manager who is leaving the company. The previous project manager tells you that the project is on schedule, but only because he has constantly pushed the team to perform. What is the first thing you should do as the new project manager?

- A. Check risk status.
- B. Check cost performance.
- C. Determine a management strategy.
- D. Tell the team your objectives.

Answer C

Explanation Before you can do anything else, you need to find a more effective management strategy. A management strategy that encourages performance and buy-in to achieving project objectives, rather than relying on micromanagement of the team, will provide a sustainable framework for a motivated team to accomplish the required work. This may require requesting a change to the resource management plan that includes adding team-building activities as well as a recognition and reward system as part of the Develop Team and Manage Team processes.

Because a goal of managing the team is to engage team members and encourage them to do their best work on the project, involving them in decisions about the work is an excellent strategy. On a properly managed project, the team has helped to create the project management plan. Because they were involved in developing the plan, the team members will be more likely to take on the attitude of, "I helped create this plan, so I do not mind being held to what is included in it." This collaboration between the project manager and team should continue in the Manage Team process.

If, on your projects, you have had difficulty gaining cooperation, could it have been due to a lack of trust, a poor (or nonexistent) recognition and reward system, a micromanaging style of leadership, or the lack of team member and stakeholder involvement in project decisions?

Managing the team takes planning and a focused effort throughout the project that includes keeping in touch with the team, addressing issues before they become problems, listening, communicating, and maintaining relationships.

If you were an observer of your project management work, what would you see? Do you have a tendency to busy yourself issuing reports, rather than really seeing what the team is doing, how team members are interacting, what they feel is missing or doesn't work, and what is generating problems? Whether your team is collocated or virtual, paying attention to the tone of interactions, including emails and phone conversations will tell you more about what is going on than simply analyzing data. A project manager should observe what is happening and talk to people to understand how things are going.

Issue Log Many project managers use issue logs, also known as issue registers or action item logs, to record problems and their resolutions. You have seen the issue log used in integration and quality processes, and you will also see it in other knowledge areas within this book. Because it is updated to reflect new issues as well as the resolution of issues, it is frequently an input and an output of the same processes.

As part of managing team members and stakeholders, the issue log can be used to communicate about issues on the project. It facilitates the assessment of the causes of issues, the impact of issues on scope, schedule, cost, risk, and other aspects of the project, and the recommendation of corrective actions that could be taken. Such a log indicates to people that their needs will be considered, even if they are not addressed at the time the issue arises. Effective project managers control issues so they do not impact the project. The issue log is updated as part of project documents updates throughout the project.

An issue log might look like the one shown in figure 9.7.

Issue #	Issue	Date Added	Raised By	Person Assigned	Resolution Due Date	Status	Date Resolved	Resolution

FIGURE 9.7 Issue log

An issue log should be customized to meet the needs of the people that will be using it. For example, an issue log could include more detail—such as a description or the category of the issue (such as team, schedule, or technical)—as preferred by the team.

Many concepts related to managing people can appear on the exam. The next several pages include information and exercises related to some important topics.

Management and Leadership Styles The exam refers to management and leadership styles using the terms and concepts discussed in this section. However, there is no one right way to lead or manage that fits all situations or all project managers. Project managers should know the science of project management and make educated decisions about what they are doing, even when it comes to interacting with and managing people. To choose the most effective approach when answering exam questions, you must consider the information in the scenario, including whether the management and leadership of the project manager have been effective up to this point, what the skill levels, experience, and needs of your team members are, and how complex the project work is.

TRICKS OF THE TRADE You will likely need to use many leadership approaches throughout the life of a project. The term “situational leadership” refers to a manager using different leadership styles based on the people and project work they are dealing with. For example, there is a general consensus that a project manager needs to provide more direction (directing leadership style) at the beginning of the project because the project manager knows the project management work that must be done to plan the project. During project executing, the project manager needs to do more coaching, facilitating, supporting, influencing, and delegating.

You should be aware of some key terms related to management and leadership styles in the context of managing a project. On the exam, expect questions that describe a situation and then ask what you should do. The options might include solutions that involve using various forms of leadership styles; you will need to select the best answer based on the situation presented. The three bulleted lists that follow include

important terms and definitions. Read the definitions two or three times so you are familiar with the terms before you see them used on the exam.

Some of the primary styles that you may see described in situational questions include the following:

- **Directing** The project manager uses their expertise to guide team members in what to do.
- **Facilitating** The project manager enables communication and helps remove roadblocks.
- **Coaching** The project manager advises and makes recommendations, helping the team and other stakeholders achieve their goals.
- **Supporting** The project manager encourages and provides assistance to team members and stakeholders in working through the situations they encounter.
- **Influencing** The project manager emphasizes teamwork, team building, and team decision-making, and works with their team to influence collaborative, successful project implementation.
- **Delegating** The project manager establishes goals and then gives the project team sufficient authority to complete the work. For basic project management, the manager involves the team in the planning process and assigns or delegates planning and executing work to team members. Delegating can be hard for some people because they feel they can do the work better themselves. Using proper project management practices should help a project manager feel comfortable that others know what needs to be done and that the project can be successful.

The following management and leadership styles may be particularly effective when the team is dealing with issues such as resolving conflicts, negotiating, prioritizing, or other decision-making activities:

- **Consultative** This bottom-up approach uses influence to achieve results. The project manager considers others' opinions and acts as the servant-leader for the team.
- **Consensus** The project manager encourages problem-solving in a group and makes decisions based on group agreement.
- **Democratic or participative** This style involves encouraging team participation in the decision-making process. Team members "own" the decisions made by the group, resulting in improved teamwork and cooperation.
- **Bureaucratic** This style focuses on following procedures exactly. The bureaucratic style may be appropriate for work in which details are critical or when specific safety or other regulations must be strictly adhered to.
- **Analytical** This style depends on the manager's own technical knowledge and ability. Analytical managers often make the technical decisions for the project and then communicate those decisions to their teams. Interview-style communication, in which the project manager asks questions to get the facts, is common with this management style.

Some management and leadership styles that may be described in situational questions or answer choices are not inherently bad, but they may create challenges for the project manager, team, and other stakeholders. For example, if the success of a project team is based on the charisma of its project manager, rather than on a strong management plan, and that project manager leaves the organization mid-project, the team may falter. Or, if a project manager takes a laissez-faire approach, and the team is not sufficiently skilled or motivated, it may be difficult to get the work done as planned. The following management and leadership styles are ones that have the potential to create such challenges:

- **Charismatic** Charismatic managers energize and encourage their teams in performing project work. With this style, project success may become dependent on the presence of the charismatic leader, with the team relying on the leader for motivation.
- **Autocratic** This is a top-down approach. The manager may coach or delegate, but everyone does what the manager tells them to do.

- **Consultative-autocratic** In this style, the project manager solicits input from team members, but retains decision-making authority.
- **Laissez-faire** The French term “laissez-faire” has been translated as meaning “allow to act,” “allow to do,” or “leave alone.” A laissez-faire manager is not directly involved in the work of the team, but manages and consults as necessary. This style can be appropriate with a highly skilled team.
- **Driver** A manager with a driver style is constantly giving directions. Their competitive attitude drives the team to win.

Powers of the Project Manager This section could be titled, “How to Get Cooperation from the Team and Stakeholders.” Project managers can have difficulty getting people to cooperate and perform, especially if they are working in a matrix organization. Understanding the following types of power can help:

- **Formal (legitimate)** This power is based on your position. Example: “I understand you disagree. However, after careful evaluation, I believe my decision is in the best interest of the team, and this is what we are going to do.”
- **Reward** This power stems from the ability to give rewards. Example: “I understand that you want to participate in the acceptance testing of this project. Because of your performance, I will assign you as part of that team.”
- **Penalty (coercive)** This power comes from the ability to penalize team members. Example: “If this does not get done on time, I will remove you from the group traveling to the customer meeting.”
- **Expert** This power comes from being the technical or project management expert. Example: “This project manager has been successful on other projects. Let’s give her a chance!”
- **Referent** This power comes from another person liking you, respecting you, or wanting to be like you. It is the power of charisma and fame. Example: The most-liked and respected project manager in the organization says, “I think we should change the content of our standard project charter.”

NOTE: The best forms of power are expert and reward. Penalty power is generally the least effective. Formal, reward, and penalty are powers derived from your position in the company. Expert power is earned on your own.

On the exam, expect questions that describe a situation and then ask what you should do. The options might include solutions using various forms of power. You’ll then need to select the best answer based on the situation presented. To answer these questions, know that penalty is generally an incorrect choice, but make sure it isn’t the most appropriate choice for the particular situation described.

Conflict Management PAGE 348 Many situational questions on the exam describe conflicts. Therefore, to be able to pick the best choice from many “right” answers, you should understand different conflict resolution techniques and be able to determine which one is best for the situation described.

First, let’s think about conflict. Is it bad? Should we spend time preventing the root causes of conflict? Who should resolve the conflict?

Try to answer the questions just posed. Get them right, and you are likely to do well on this part of the exam. The answers are:

- No, conflict is not inherently bad.
- Yes, it is important to identify and deal with the root causes of conflict.
- Conflict should be resolved by those who are involved, possibly assisted by the project manager.

Although we often think conflict is bad, it actually presents opportunities for improvement. This is another topic many people have a different understanding about than what is supported by currently accepted research. Make sure your basic thinking about conflict is on the new side and not the old.

Changing Views of Conflict	
Old	New
Conflict is dysfunctional and caused by personality differences or a failure of leadership.	Conflict is an inevitable consequence of organizational interactions.
Conflict is to be avoided.	Conflict can be beneficial.
Conflict is resolved by physical separation or the intervention of upper management.	Conflict is resolved through openness, identifying the causes, and problem-solving by the people involved and their immediate managers.

Conflict is inevitable, in part, because of the following factors:

- The nature of projects, which attempt to address the needs and requirements of many stakeholders
- Organizational limitations on the power of the project manager
- The necessity of obtaining resources from functional (resource) managers

The project manager has a professional responsibility as part of basic project management to attempt to avoid conflicts through the following actions:

- Keeping the team informed about the following:
 - Exactly where the project is headed
 - Project constraints and objectives
 - The contents of the project charter
 - All key decisions
 - Changes
- Clearly assigning work without ambiguity or overlapping responsibilities
- Making work assignments interesting and challenging
- Following good project management and project planning practices

Note what we just stated: many conflicts can be avoided. Do you do the things on the previous list? Did you realize the project manager has a professional responsibility to do such things? They are not optional; they are good project management.

TRICKS OF THE TRADE® Many people think the main source of conflict on a project is personality differences. They may be surprised to learn that this is rarely the case. It only becomes personal if the root cause of the problem is not resolved. The following describes the seven sources of conflict in order of frequency (note that personality is last):

1. Schedules (unrealistic, resources not available)
2. Project priorities
3. Resources
4. Technical opinions
5. Administrative procedures
6. Cost
7. Personality

Conflict is best resolved by those involved in the conflict. The project manager should generally try to facilitate the resolution of problems and conflict as long as they have authority over those in conflict or over the issues in conflict. If not, the sponsor or functional managers may be called in to assist. There is one exception. In instances related to professional and social responsibility (someone breaking laws, not following policies, or acting unethically), the project manager must take the issue to someone higher in the organization.

TRICKS OF THE TRADE® When you have questions on the exam relating to conflict management, make sure you first think, "Who generally has authority over the situation described in this question?" Another good question to remember is, "What resolution of this problem would best serve the customer's interests?" Also, ask yourself, "What is the urgency with which I need to solve the conflict?" Would it be best to let everyone cool down before intervening? Or is this something that must be resolved immediately? What would happen if you didn't get involved? What will be the long-term repercussions if you involve yourself in the conflict?

The following are the main conflict resolution techniques to know for the exam. Notice that some have more than one title; you should know both.

- **Collaborating (problem-solving)** With this technique, the parties openly discuss differences and try to incorporate multiple viewpoints to arrive at a consensus. Collaboration leads to a win-win situation.
- **Compromising (reconciling)** This technique involves finding solutions that bring some degree of satisfaction to both parties. This is a lose-lose situation, since no party gets everything. Did you know that compromise is not the best choice, but rather second to collaborating?
- **Withdrawal (avoidance)** With this technique, the parties retreat or postpone a decision on a problem. Dealing with problems is a PMI-ism; therefore, withdrawal is not usually the best choice for resolving conflict, though there may be situations where it is necessary.
- **Smoothing (accommodating)** This technique includes making some concessions, and it emphasizes agreement rather than differences of opinion. It does not result in a permanent or complete resolution of the conflict.
- **Forcing (directing)** This technique involves pushing one viewpoint at the expense of another. It is a win-lose situation.

TRICKS OF THE TRADE® Remember to look for collaborating or problem-solving choices as generally the best answers. Forcing is usually the worst, but remember that the answer depends on the situation described. There could be situations in which withdrawal is the best option.

Exercise Read the description of a conflict resolution, and try to determine which of the techniques is being used.

Description	Form of Conflict Resolution This Represents
1 "Do it my way!"	
2 "Let's calm down and get the job done!"	
3 "Let us do a little of what both of you suggest."	
4 "Let's deal with this issue next week."	
5 "Miguel and Kathleen, both of you want this project to cause as little distraction to your departments as possible. With that in mind, I am sure we can come to an agreement on the purchase of equipment and what is best for the project."	
6 "We have talked about new computers enough. I do not want to get the computers, and that is it!"	
7 "Miguel, you say the project should include the purchase of new computers, and Kathleen, you say the project can use existing equipment. I suggest we perform the following test on the existing equipment to determine if it needs to be replaced."	
8 "Let's see what everyone thinks, and try to reach a consensus."	
9 "Since we cannot decide on the purchase of new computers, we will have to wait until our meeting next month."	
10 "Miguel, what if we get new computers for the design activity on the project and use the existing computers for the monitoring functions?"	

Answer

Description	Form of Conflict Resolution This Represents
1 "Do it my way!"	Forcing
2 "Let's calm down and get the job done!"	Smoothing
3 "Let us do a little of what both of you suggest."	Compromising
4 "Let's deal with this issue next week."	Withdrawal
5 "Miguel and Kathleen, both of you want this project to cause as little distraction to your departments as possible. With that in mind, I am sure we can come to an agreement on the purchase of equipment and what is best for the project."	Smoothing
6 "We have talked about new computers enough. I do not want to get the computers, and that is it!"	Forcing

Description	Form of Conflict Resolution This Represents
7 "Miguel, you say the project should include the purchase of new computers, and Kathleen, you say the project can use existing equipment. I suggest we perform the following test on the existing equipment to determine if it needs to be replaced."	Collaborating
8 "Let's see what everyone thinks, and try to reach a consensus."	Collaborating
9 "Since we cannot decide on the purchase of new computers, we will have to wait until our meeting next month."	Withdrawal
10 "Miguel, what if we get new computers for the design activity on the project and use the existing computers for the monitoring functions?"	Compromising

Emotional Intelligence PAGE 349 Emotional intelligence is the ability to recognize and express one's emotions appropriately, and to perceive and manage the emotions being expressed by others using observation, communication, and interpersonal skills. An emotionally intelligent project manager is able to establish and maintain positive relationships by adjusting communications and anticipating the needs of others. They understand how emotion can drive the behavior of others and are able to use this understanding when dealing with issues and concerns of the team. Emotionally intelligent project managers are able to effectively use conflict resolution techniques—such as collaborating or smoothing, rather than forcing—because they are perceived as being trustworthy and fair.

Emotional intelligence enables a project manager to bring out the best in coworkers and team members by making them feel valued and important. Clearly, this trait is an asset for a project manager. Emotional intelligence can be developed and increased with study and practice.

TRICKS OF THE TRADE

Other Important Terms One of the things that drives people crazy about the exam is that they see terms they do not know. The following discussion of topics related to human resource management should help you get more familiar with some terms that have been on the exam but which you may not have run across previously. Note that the exam can have made-up terms and processes as answer choices. But remember, if you are well trained in project management and you see a term on the exam that you do not recognize, chances are it is not the right answer!

- **Expectancy theory¹⁴** Employees who believe their efforts will lead to effective performance and who expect to be rewarded for their accomplishments will remain productive as rewards meet their expectations.
- **Arbitration** In arbitration, a neutral party hears and resolves a dispute.
- **Perquisites (perks)** Some employees receive special rewards, such as assigned parking spaces, corner offices, organizational logo apparel, and executive dining.
- **Fringe benefits¹⁵** These are the standard benefits formally given to all employees, such as education benefits, insurance, and profit sharing.

Outputs of Manage Team Plans for releasing team members are included in the resource management plan. Because the length and focus of assigned work varies, team members may be released at different times throughout the project, as their work is completed. Whenever it occurs, release of team members is considered a part of this process.

As an output of this process, change requests may be needed to reflect changes in resource assignments, costs, schedule, or any other part of the project management plan or project documents. Examples include changes to plans for recognition and rewards, or newly identified needs for team training.

The issue log and lessons learned may be updated based on results of team management efforts. In addition, the existing systems for human resource management appraisals and evaluations may be updated.

Control Resources PAGE 352

Process Control Resources
Process Group Monitoring & Controlling
Knowledge Area Resource Management

While the previous two resource management processes involved human resources, the Control Resources process relates to physical resources being used on the project. To control physical resources, the project manager must ensure that the physical resources assigned to the project are available when they are needed—in the right place and in the right quantity.

In this process, the project manager also monitors the amount, costs, and quality of resources being used, and compares that to what was planned. If there are any discrepancies between the planned versus actual utilization, corrective action may be necessary.

Remember the concept of integration and how the project processes are related. Imagine a team of construction workers arriving on site only to find that the building materials and construction equipment have not yet arrived. An issue with the management of physical resources could impact not only the resource management plan, but also schedule and cost, and potentially scope and quality.

The resource management plan indicates how physical resources should be utilized, controlled, and eventually released. Other inputs to assist the project manager in controlling resources include project documents, agreements and contracts, and work performance data—all of which are discussed in the following sections.

Project Documents PAGE 354

Use the following project documents to determine how you will control resources.

- **Issue log** This document provides information about current issues regarding resource usage on the project. Issues might include availability (over- or under-supply), usage (more or less resources being used than what was planned), quality discrepancies, and cost overruns related to resource usage.
- **Lessons learned register** The project manager may be able to benefit from previous project experience with resource control efforts and from historical lessons learned from other similar projects.
- **Resource assignments** Resource assignments show anticipated resource usage and where the resources are coming from.
- **Project schedule** The project schedule indicates what resources are planned to be used, on which activities, and when they are needed.

- **Resource breakdown structure** Resource requirements are likely documented in a resource breakdown structure, which may be referenced by the project manager when a physical resource needs to be reordered or replaced.
- **Resource requirements** Resource requirements include what materials, supplies, and equipment are needed.
- **Risk register** The risk register includes information on potential risks related to the acquisition and use of physical resources. The project manager and team must be aware of these risks, so they are able to recognize risk triggers and initiate risk responses. Newly identified risks to physical resources may be added to the risk register throughout this process.

Agreements/Contracts PAGE 355 If any of the physical resources being used on the project were obtained from a source external to the project, a contract includes details on the procurement as well as the seller's contact information, which can be important in case issues arise related to the delivery or quality of the resources, or if additional resources are needed from the same source.

Work Performance Data PAGE 355 This documentation provides a measurement of resources used, dates they arrived, and whether they worked as intended. Analysis of work performance data, the issue log, and other inputs gives the project manager an idea of how actual resource usage compares to the plan. The tools and techniques discussed in the following sections are used to evaluate ways to address any variances from the plan.

The following tools and techniques may be used as part of the Control Resources process.

Performance Reviews The project manager may undertake a performance review to analyze actual versus planned resource usage and performance. Cost and schedule data may be included in this analysis to determine possible causes of variance from the resource management plan.

Trend Analysis The project manager may compare measurements taken throughout the project to assess resource usage and then use that information to extrapolate potential future usage. This process also compares data to determine whether resource performance is improving or worsening.

Alternatives Analysis Options for dealing with variances—such as purchasing more or different resources or adding staff to expedite the use of those resources—may be evaluated to determine the most effective way to bring physical resource utilization back to what was planned, or to accommodate improvements in usage. For each option, the project manager might consider factors such as availability, quality, cost, and speed. The options are weighed to determine the most beneficial and cost-effective solution.

Also note that the project manager may use cost-benefit analysis to determine the most cost-effective way to correct a problem or improve a situation. This may be performed as part of alternatives analysis.

Project Management Information System (PMIS) You have seen throughout this book that the PMIS is used in many areas of project management. In this process, it can be used to track, access, and analyze data on the use of resources and to problem-solve issues regarding resource management. The results of these efforts will be stored in the PMIS so they are accessible throughout the organization.

Problem-Solving Method As with many other topics in this chapter, you likely have some experience with problem-solving methods. However, you may not use the terms or processes tested on the exam, and you might not have learned the methods as a science. Many people solve problems using an incorrect method. Try the next exercise to test your problem-solving knowledge.

Exercise What steps would you use to solve a problem?

Answer The important thing to realize about problems is that they typically continue until the root cause is discovered and addressed. Many people prefer to avoid conflict (withdraw) instead of solving the problem. Imagine a senior manager who is arbitrarily reassigning physical resources that were committed to your project. Would you deal with it, or delay action? Would you deal directly with the person or try to avoid doing so?

Questions in this area are not always easy. Before you read on, keep in mind that people have failed the exam because they did not “see” the problems explained in questions or they solved the problems the wrong way. So, let’s look at a preferred problem-solving method that will help you when answering exam questions. Note that the *PMBOK® Guide* includes more than one version of the problem-solving method, although the progression through the steps of the technique are similar in each version.

1. Define the real or root problem, not what is presented to you or what appears to be the problem.
2. Analyze the problem.
3. Identify solutions.
4. Pick a solution.
5. Implement a solution.
6. Review the solution, and confirm that the solution solved the problem.

As you have been studying, you might have been saying to yourself, “I do not have time to do that!” The issue may not be that you do not have time, but that you are spending your time focused on the wrong areas. How can you afford not to identify and solve the real problem? Think about step 6 from the previous list. If you do not make sure the problem is resolved, it could just return and take up more of your valuable time.

TRICKS OF THE TRADE

When questions on the exam require you to solve problems, ask yourself, “What is the real problem behind the situation presented?” Here is an example:

During project executing, the construction manager notifies the project manager that the grade of materials in the shipment received from the supplier today is different than that of the previous shipments in the order. This is the third of five shipments from the supplier. What should the project manager do?

What would you do? Would you call the seller, and investigate why the quality was different? If so, you would get the answer wrong on the exam. This situation combines procurement with resource management. The situation requires the project manager to know the terms of the contract and determine if the delivery of a different grade of material is allowable based on the terms of the contract.

As part of the Control Resources and Control Procurements processes, the project manager would check the resource requirements and the resource assignments, and possibly work with the procurement manager to determine if a breach by the seller has occurred. If a breach has not occurred, the project manager would communicate to the construction manager that the shipment is in alignment with the contract terms. If the shipment does not meet agreed-upon specifications, the seller has breached the contract by not doing something required in the contract. The required legal action for a breach is to send written notification of the breach first, not call the seller to ask why. You need to understand both your responsibility as a project manager and the real problem.

While root cause analysis and problem-solving are extremely important, they are not the best answer in every situation. Some questions indicate that there is a “fire,” and ask you what to do about it. You might choose the answer that amounts to “find out why there is a fire” even though you should choose the choice that relates to “get out of the danger zone” as your first response. This could be followed by root cause analysis to identify and solve the cause of that particular fire.

Making sure you are solving the right problem is extremely important. It is a significant issue for many people who take the exam, especially those who have never managed projects that are more than a few months long or who have not had formal training in project management.

The outputs of the Control Resources process include work performance information, change requests, and updates to project documents and the project management plan.

Work Performance Information Did you notice that work performance data is an input to this process, and work performance information is an output? The difference is that the work performance data is raw data. It is analyzed in this process, and used to compare actual to planned results to create work performance information.

Project Documents The documents that were inputs to this process may be updated based on the work of monitoring and controlling resources. These documents may include the issue log, the lessons learned register, resource assignments, the project schedule and risk register, and the resource breakdown structure.

Project Management Plan Components of the project management plan, specifically the resource management plan, may be updated to reflect minor changes in the usage, availability, and quality of resources. In addition to the resource management plan, the project schedule, cost baselines, and quality management plan may be changed as a result of this process.

Practice Exam

1. All the following are forms of power derived from the project manager's position except:
 - A. Formal
 - B. Reward
 - C. Penalty
 - D. Expert
2. The highest point of Maslow's hierarchy of needs is:
 - A. Physiological satisfaction
 - B. Attainment of survival
 - C. Need for association
 - D. Esteem
3. Senior management has been extremely impressed by a new team member on the software development project. The team member has enthusiastically and efficiently completed his assigned activities. He has also demonstrated courtesy, respect, and consideration to everyone around him. For these reasons, management is planning to promote the team member to a business analyst position that is currently open on the project. The halo effect refers to the tendency to:
 - A. Promote from within.
 - B. Hire the best.
 - C. Move people into new roles or new technical fields because they are good in their current technical field.
 - D. Move people into project management because they have had project management training.
4. The replacement of an important legacy system in the organization will be challenging because there are offices in seven countries, and the business operations cannot be interrupted. Your objective is to have the system updated before new regulations go into effect in one of the participating countries. There are many opinions on how the system should be changed. Some stakeholders are expecting that the new system will encompass more capabilities than the current system. Both internal team members and consultants will be involved in making the hardware and software changes. The sponsor is hoping to keep costs down by using organizational team members to perform the testing and installation activities. You are defining the roles and responsibilities of the stakeholders on the project. The sponsor's role on a project is best described as:
 - A. Helping to plan activities
 - B. Helping to prevent unnecessary changes to project objectives
 - C. Identifying unnecessary project constraints
 - D. Helping to develop the project management plan
5. The project is expected to take four years. The project team members will not all be coming on at the start of the project, but rather will join and leave the team as needed. Historically, projects similar to this one have been volatile, and the work intense. Therefore, conflict between team members is almost inevitable. Which of the following conflict resolution techniques will generate the most lasting solution?
 - A. Forcing
 - B. Smoothing
 - C. Compromise
 - D. Problem-solving

Resource Management NINE

6. The most common causes of conflict on a project are schedules, project priorities, and:
 - A. Personalities
 - B. Resources
 - C. Cost
 - D. Management
7. Two stakeholders are disagreeing via a series of emails as to whether a deliverable meets the acceptance criteria. One of the stakeholders wanted different criteria, but the cost-benefit analysis done in planning did not support delivering that level of performance. The stakeholders agreed that the higher level of performance was not required and was not cost effective. A team member has just informed you that a problem with her work has occurred. The deliverable she is working on must be shipped today, or there will be a project breach. One of the stakeholders having the email disagreement comes to you to complain about the other. You say, "I cannot deal with this issue right now." Which of the following techniques are you using?
 - A. Problem-solving
 - B. Forcing
 - C. Withdrawal
 - D. Compromising
8. What does a resource histogram show that a responsibility assignment matrix does not?
 - A. Time
 - B. Activities
 - C. Interrelationships
 - D. The person in charge of each activity
9. You have just been assigned as project manager for a large telecommunications project. This one-year project is about halfway done. The project team consists of 5 sellers and 20 of your company's employees. You want to understand who is responsible for doing what on the project. Where would you find this information?
 - A. Responsibility assignment matrix
 - B. Resource histogram
 - C. Bar chart
 - D. Project organizational chart
10. During project planning in a matrix organization, the project manager determines that additional human resources are needed. From whom would she request these resources?
 - A. The PMO manager
 - B. The functional manager
 - C. The team
 - D. The project sponsor
11. A project manager must publish a project schedule. Activities, start/end times, and resources are identified. What should the project manager do next?
 - A. Distribute the project schedule according to the communications management plan.
 - B. Confirm the availability of the resources.
 - C. Refine the project management plan to reflect more accurate costing information.
 - D. Publish a bar chart illustrating the timeline.

12. During every project team meeting, the project manager asks each team member to describe the work they are doing, and then assigns new activities to team members. The length of these meetings has increased because there are many different activities to assign. This could be happening for all the following reasons except:
- A. Lack of a WBS
 - B. Lack of a responsibility assignment matrix
 - C. Lack of resource leveling
 - D. Lack of team involvement in project planning
13. You are a project manager leading a cross-functional project team in a weak matrix environment. None of your project team members report to you functionally, and you do not have the ability to directly reward their performance. The project is difficult, involving tight schedule constraints and challenging quality standards. Which of the following types of project management power will likely be the most effective in this situation?
- A. Referent
 - B. Expert
 - C. Penalty
 - D. Formal
14. A team member is not performing well on the project because they are inexperienced in system development work. There is no one else available who is better qualified to do the work. What is the best solution for the project manager?
- A. Consult with the functional manager to determine project completion incentives for the team member.
 - B. Obtain a new resource more skilled in development work.
 - C. Arrange for the team member to get training.
 - D. Allocate some of the project schedule reserve.
15. A project has several teams. Team C has repeatedly missed deadlines in the past. This has caused team D to have to crash the critical path several times. As the team leader for team D, you should meet with:
- A. The leader of team C
 - B. The project manager
 - C. The project manager and management
 - D. The project manager and the leader of team C

Resource Management NINE

16. The project manager and the team are excited about the new project. This is the project manager's first assignment as project manager, and the team feels they will be able to complete work that has never been tried before. There are 29 people contributing to the product description, and the team consists of nine experienced experts in their fields.
- Part way through planning, three highly skilled technical team members are disagreeing about the scope of two of the deliverables. One is pointing to the draft WBS and saying that two additional work packages should be added. Another is saying that a particular work package should not even be done. The third team member agrees with both of them. How should the project manager best deal with the conflict?
- A. She should listen to the differences of opinion, determine the best choice, and implement that choice.
 - B. She should postpone further discussions, meet with each individual, and determine the best approach.
 - C. She should listen to the differences of opinion, encourage logical discussions, and facilitate an agreement.
 - D. She should help the team focus on points on which they agree and build unity by using relaxation techniques and common-focus team building.
17. The project is just starting out and consists of people from 14 different departments. The project charter was signed by one person and contains over 30 major project requirements. The sponsor has informed the project manager that the SPI must be kept between 0.95 and 1.1. A few minutes of investigation resulted in the identification of 34 stakeholders, and the schedule objectives on the project are constrained. The project manager has just been hired. Which of the following types of power will best help the project manager gain the cooperation of others?
- A. Formal
 - B. Referent
 - C. Penalty
 - D. Expert
18. A project manager is trying to settle a dispute between two team members. One says the systems should be integrated before testing, and the other maintains each system should be tested before integration. The project involves over 30 people, and 12 systems need to be integrated. The sponsor is demanding that integration happen on time. What is the best statement the project manager can make to resolve the conflict?
- A. Do it my way.
 - B. Let's calm down and get the job done.
 - C. Let's deal with this again next week after we all calm down.
 - D. Let's do limited testing before integration and finish testing after integration.
19. A project is in the middle of the executing effort when a stakeholder suggests a change that would result in the third major overhaul of the project. At the same time, the project manager discovers that a large work package was not completed because a team member's manager moved her to another project that had a higher priority. Of the following, who is the best person for the project manager to address these issues with?
- A. The team
 - B. Senior management
 - C. The customer
 - D. The sponsor

20. The installation project has a CPI of 1.03 and an SPI of 1.0. There are 14 team members, and each team member had input into the final project management plan. The customer has accepted the three deliverables completed so far without complaint, and the responsibility assignment matrix has not changed since the project began. The project is being completed in a matrix environment, and there are no contracts needed for the project.

Although the sponsor is happy with the status of the project, one of the team members is always complaining about how much time his project work is taking. Which of the following is the best thing for the project manager to do?

- A. Review the reward system for the project.
 - B. Try to improve schedule performance of the project.
 - C. Meet with the customer to try to extend the schedule.
 - D. Gain formal acceptance in writing from the customer.
21. The project has been challenging to manage. Everyone has been on edge due to pressure to complete the project on time. Unfortunately, the tension has grown to the point where team meetings have become shouting matches, with little work accomplished during the meetings. One team member asks to be excused from future team meetings, as all the shouting upsets him. Meanwhile, the sponsor has expressed interest in attending future team meetings to hear how the project is going and to better understand the issues involved in completing the project. In addition, the customer has started discussions about adding scope to the project. In this situation, it would be best for the project manager to:
- A. Ask the sponsor if the information needed could be sent in a report rather than have her attend the meetings.
 - B. Inform the team member who asked to be excused from the meetings of the value of communication in such meetings.
 - C. Involve the team in creating ground rules for the meetings.
 - D. Hold a team-building exercise that involves all the team members.
22. Project performance appraisals are different from team performance assessments in that project performance appraisals focus on:
- A. How an individual team member is performing on the project
 - B. An evaluation of the project team's effectiveness
 - C. A team-building effort
 - D. Reducing the staff turnover rate
23. A project manager had a complex problem to solve and facilitated a team decision about what needed to be done. A few months later, the problem resurfaced. What did the project manager most likely not do?
- A. Perform proper risk analysis.
 - B. Confirm the decision solved the problem.
 - C. Have the project sponsor validate the decision.
 - D. Use an Ishikawa diagram.

Resource Management NINE

24. The project cost performance index (CPI) is 1.02, the benefit-cost ratio is 1.7, and the latest round of performance reviews identified few required adjustments. The project team was colocated in a new building when the project started. Everyone commented on how excited they were to have all new facilities. The sponsor is providing adequate support for the project, and few unidentified risks have occurred. In an attempt to improve performance, the project manager spends part of the project budget on new chairs for the team members and adds the term "senior" to each team member's job title. Which of the following is the most correct thing that can be said of this project or the project manager?
- A. The project manager has misunderstood Herzberg's theory.
 - B. The project is slowly spending more money than it should. The project manager should begin to watch cost more carefully.
 - C. The performance review should be handled better to find more adjustments.
 - D. The project manager should use good judgment to determine which variances are important.
25. You just found out that a major subcontractor for your project consistently provides deliverables late. The subcontractor approaches you and asks you to continue accepting late deliverables in exchange for a decrease in project costs. This offer is an example of:
- A. Confronting
 - B. Compromise
 - C. Smoothing
 - D. Forcing
26. During the first half of the project, five team members left for other projects without being replaced, two team members went on vacation without informing you, and other team members expressed uncertainty about the work they were to complete. In this situation, it is best if you update which of the following for the second half of the project?
- A. Communications management plan
 - B. Resource histogram
 - C. Resource management plan
 - D. Responsibility assignment matrix
27. The project manager is looking at the project's resource needs and lessons learned from past projects. This information causes the project manager to be concerned about her ability to acquire enough resources for the project in six months. Which of the following would be the least effective preventive action?
- A. Make sure functional managers have a copy of the resource histogram.
 - B. Show the sponsor the data, and explain the project manager's concern.
 - C. Determine metrics to use as an early warning sign that resources will not be available.
 - D. Ask functional managers for their opinions.
28. A large project is underway when one of the team members reviews the project status report. He sees the project is currently running late. As he looks at the report further, he notices the delay will cause one of his activities to be scheduled during a time he will be out of the country and will be unable to work on the activity. This is of great concern to the team member because he is committed to the success of the project and does not want to be the cause of the project being further delayed. What is the best thing for him to do?
- A. Contact the project manager immediately to provide the project manager with his schedule.
 - B. Include the information in his next report.
 - C. Request that the issue be added to the project issue log.
 - D. Recommend preventive action.

29. Many work packages have been successfully completed on the project, and the sponsor has made some recommendations for improvements. The project is on schedule to meet an aggressive deadline when the successor activity to a critical path activity suffers a major setback. The activity has 14 days of float and is being completed by four people. There are two other team members with the skill set to assist the troubled activity, if needed.

The project manager finds out that three other team members are attempting to be removed from the project because they do not feel the project can be successful. When the project manager investigates, she discovers that those team members have issues that have not been addressed.

Which of the following is the best thing to do to improve the project?

- A. Have the team members immediately assist the troubled activity.
 - B. Investigate why the project schedule is aggressive.
 - C. See who can replace the three team members.
 - D. Create an issue log.
30. In determining the physical resource requirements of the project, the team has identified the need for a highly specialized piece of testing equipment that will be used for approximately six months. The organization only owns one of these units, and it has been committed to other projects during the time this team will need it. Purchasing another similar unit is assumed to be cost-prohibitive. Which of the following is the least effective action for the project manager to take?
- A. Negotiate with the project manager that has reserved the equipment during the time it is needed by this team.
 - B. Consult with the procurement department about the possibility of leasing a similar unit.
 - C. Request that the sponsor intervene on behalf of the project.
 - D. Adjust the schedule so that the work requiring the equipment can be done when the equipment is available.
31. A project is being completed by a virtual team with team members from six countries. From their various locations, the team members are arguing about which office will take the lead on the project, disagreeing over meeting schedules, and questioning the abilities of individuals whom they have not worked with before. In which stage of the Tuckman ladder is this team functioning?
- A. Forming
 - B. Reforming
 - C. Storming
 - D. Resourcing
32. A team member has missed the last two team meetings. Several of his assigned deliverables were completed late, and not all were of acceptable quality. He requests a meeting with the project manager, where he explains that he has been dealing with a number of personal issues, which he realizes have affected his work. Although this has been concerning for the project manager, as he has had to smooth the irritation of other team members and even taken on some of the team member's responsibilities, the project manager shows concern to the team member. He works with the team member to reschedule his work to allow him long weekends to deal with his personal situation. This is an example of:
- A. Expectancy theory
 - B. Theory Y management
 - C. Emotional intelligence
 - D. Problem-solving

Answers

1. Answer D

Explanation When someone is given the job of project manager, they will have formal, reward, and penalty power. But just having the position does not make the project manager either a technical or project management expert. Expert power has to be earned.

2. Answer D

Explanation This question is asking which of the *following* is the highest. Self-actualization is not listed, so the next best choice is esteem.

3. Answer C

Explanation The halo effect refers to the tendency to rate team members high or low on all factors due to the impression of a high or low rating on one specific factor. It can result in a decision to move people into a different technical field because they are good in their current technical field. However, just because a person is good in one technical field does not mean they will also be good in another technical field.

4. Answer B

Explanation Although the sponsor may help plan some of the activities, it is not their exclusive duty. Some project constraints come from the sponsor, but they should be considered necessary. The project management plan is created with the team and approved by the sponsor and other management. Since the project objectives are stated in the project charter, and it is the sponsor who issues the project charter, helping to prevent unnecessary changes to project objectives is the correct answer.

5. Answer D

Explanation Problem-solving (also referred to as collaborating) normally takes more time, but it gets buy-in from everyone, generating a more lasting solution.

6. Answer B

Explanation Know the top four sources of conflict on projects (schedules, project priorities, resources, and technical opinions) so you can be prepared to answer questions that relate to sources of conflict and how to deal with them. Don't be fooled because "personality" is on the list. It is not a major cause of conflict.

7. Answer C

Explanation Delaying the issue is called withdrawal.

8. Answer A

Explanation The responsibility assignment matrix maps specific resources to the work packages from the WBS. On a resource histogram, the use of resources is shown individually or by groups over time.

9. Answer A

Explanation The resource histogram shows the number of resources used in each time period. In its pure form, a bar chart shows only activity and calendar date. The organizational chart shows who reports to whom. The responsibility assignment matrix shows who will do the work.

10. Answer B

Explanation In a matrix organization, power is shared between the functional manager and the project manager, so the project manager needs to negotiate with the functional manager for the resources.

11. Answer B

Explanation The project schedule remains preliminary until resource assignments are confirmed.

12. Answer C

Explanation The lack of a WBS, responsibility assignment matrix, or team involvement in planning could contribute to excessively long meetings during which resources are assigned to activities. Resource leveling refers to maintaining the same number of resources on the project for each time period and would not impact the length of meetings.

13. Answer B

Explanation Reward and expert are the best types of power to use in such a situation. Reward is not listed as a choice, and the question says the project manager has limited ability to reward the team members. Therefore, expert power is the correct answer.

14. Answer C

Explanation The job of the project manager includes providing or obtaining project-specific training for team members. This kind of training may be a direct cost of the project.

15. Answer D

Explanation Those involved in the problem should resolve the problem. The fact that team D has had to crash the critical path several times implies that team D has already tried to deal with this problem. In this case, the two team leaders need to meet. The extent of this situation requires the project manager's involvement as well.

16. Answer C

Explanation Do not get confused by the wordiness of the question. Ask yourself what the best way is to resolve any conflict, and you can get the answer. Most of the details provided are distractors. Problem-solving (collaborating) and compromising are the two most important conflict resolution techniques. Conflict management is a key interpersonal and team skill.

17. Answer A

Explanation Generally, the best forms of power are reward or expert. The project manager has not had time to become a recognized expert in the company, and reward power is not included as a choice here. This leaves formal power as the only logical answer.

18. Answer D

Explanation Doing limited testing before integration and finishing testing after integration is an example of compromising. This is the best way for the project manager to resolve the conflict in this situation.

19. Answer D

Explanation It is the sponsor's role to prevent unnecessary changes and to set priorities among projects. The situation described in this question implies that such work is not being done. The project manager must therefore go to the root of the problem: the sponsor.

20. Answer A

Explanation Improving schedule performance relates to getting the project completed sooner. Although it would seem to be a good idea to improve schedule performance, this project's performance is fine. The schedule has been approved as it is. It would be better for the project manager to spend more time controlling the project to make sure it finishes according to plan than to improve schedule performance.

If you chose attempting to extend the schedule, look at the SPI. There is nothing wrong with the schedule performance of the project that would require an extension. Gaining formal acceptance from the customer will need to be done, as it provides an opportunity for the team to check if everything is going well. This action will not affect the team member's dissatisfaction, however.

The only real problem presented in this situation is that the team member is complaining. If you read the question completely, you will notice that the team member was involved in creating and approving the project management plan, which included details about his own involvement in the project. Because the responsibility assignment matrix has not changed, the team member has not even been assigned different duties since the project began. There must be something else causing the team member to complain. The project manager should investigate and find out if the reward system is ineffective.

21. Answer C

Explanation Here is a situation in which all four choices could be done, but there is one best answer. Asking the sponsor if the information could be sent in a report does not solve the root cause of the problem described. Informing the team member of the value of communication in meetings merely dismisses the concerns of the team member. A team-building exercise would take planning, so it could not be done right away. Remember, the sponsor might be attending the next meeting, and at least one team member might not attend because of past problems. The best thing to do would be to set up new ground rules governing team behavior and then plan a team-building exercise.

22. Answer A

Explanation The best thing to do is to look at the two terms used here (project performance appraisals and team performance assessments), and review in your mind what each means before looking at the choices. Team performance assessments evaluate the project team's effectiveness as a whole. Project performance appraisals deal with how each team member is performing on the project.

23. Answer B

Explanation Notice the phrasing of this question, "most likely not do." Expect to see questions worded on the exam in ways that can cause you to misinterpret them. You will also see questions about things we forget to do in the real world. "Who has time," you might say, "to determine if each problem is really solved?" One could respond with, "Who has time not to do this? Who has time to deal with the same problem twice?" The final steps of problem-solving include implementing a decision, reviewing it, and confirming that the decision solved the problem.

24. Answer A

Explanation The option of the project manager watching cost more closely could trick you into selecting it if you are unsure of the real answer. There is no indication that the costs are trending in any particular direction. There is no reason to think that performance reviews would turn up more adjustments. The project manager should always use good judgment but because nothing in this question talks about judgment regarding variances, this cannot be the best choice. In this situation, the project manager is making great working conditions better by buying new chairs and enhancing the team members' titles. According to Herzberg's theory, fixing bad working conditions will help motivate the team, but making good ones better will not improve motivation. The project manager needs to focus on the motivating agents and not the hygiene factors.

25. Answer B

Explanation Both parties are giving up something. This is a compromise.

26. Answer C

Explanation The resource histogram shows the resources used per time period, but it would provide limited benefit in this situation. The responsibility assignment matrix cross-references resources with the activities or work packages they are to accomplish to help give clarity to the team members on their assignments, but it does not show when they will be required to do their work. The resource management plan, which describes when resources will be brought onto and taken off the project as well as how team members should communicate with the project manager, would provide the most benefit for this project.

27. Answer A

Explanation Sending data without pointing out the issue does not mean the communication will be adequately decoded by the recipient. The other choices describe more effective communication in this instance.

28. Answer D

Explanation Notice that this question asks what the team member should do. It is important for the project manager to understand the team member's role and possibly even instruct team members on how to work on projects and what is expected of them. Providing the project manager with his schedule, including the information in a report, and requesting that the issue be added to the issue log have one thing in common. They involve the team member asking the project manager to do something. In reality, it may well be the team member who will come up with a solution (for example, decreasing the scope of the activity, fast tracking, or specific suggestions about changes to predecessor activities). Therefore, recommending preventive action is the best choice for the team member. Note that recommended corrective or preventive actions can come from the team or stakeholders in addition to the project manager.

29. Answer D

Explanation Sometimes complex problems are caused by not doing simple things. After you read the answer options, you should realize that the data in the first paragraph is completely extraneous. The troubled activity has float and so does not need immediate attention. It may not be necessary for additional team members to assist the troubled activity, but none of the choices suggest investigating whether the amount of float is enough to cover any delay caused by the trouble. Rather, the choices take you in different directions.

Investigating why the schedule is so aggressive should have been done before the project began. Replacing team members does not solve the root cause of the problem. Could there be something the project manager is doing wrong, or could be doing that she is not, that would solve the problem without losing resources? Wouldn't it be more effective to discover the root cause of those team members' concerns so the problem does not surface again later? The creation of an issue log will let the troubled team members know their concerns have been heard, are noted, and will be resolved. This might be enough to stop them from leaving and avoid the resultant project delays and confusion if new team members must be added.

30. Answer C

Explanation It is a professional responsibility of the project manager to consider the needs of the entire organization, not only those of his project. It is also the project manager's responsibility to attempt to deal with the situation before involving the sponsor. For these reasons, involving the sponsor is not the best thing to do. All the other choices are options the project manager should consider first.

31. Answer C

Explanation The team's disagreements are indicative of the storming stage of development. As they continue working together, they will move into the norming stage.

32. Answer C

Explanation Emotional intelligence enables a project manager to bring out the best in coworkers and team members by making them feel valued and important. In this case, he was able to show empathy while still working out a plan for the team member to fulfill his project responsibilities.