

Exercise: Draw a Network Diagram

Draw a network diagram based on the following information, and then answer questions 1-7 below.

You are the project manager for a new project and have figured out the following dependencies:

- Activity 1 can start immediately and has an estimated duration of 3 weeks.
- Activity 2 can start after activity 1 is completed and has an estimated duration of 3 weeks.
- Activity 3 can start after activity 1 is completed and has an estimated duration of 6 weeks.
- Activity 4 can start after activity 2 is completed and has an estimated duration of 8 weeks.
- Activity 5 can start after activity 4 is completed and after activity 3 is completed. This activity takes 4 weeks.

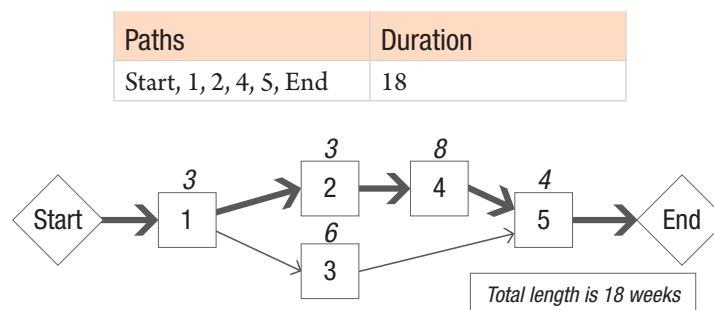
Questions:

1. What is the duration of the critical path?
2. What is the float of activity 3?
3. What is the float of activity 2?
4. What is the float of the path with the most float?
5. The resource working on activity 3 is replaced with another resource who is less experienced. The activity will now take 10 weeks. How will this affect the project schedule?
6. A new activity 6 is added to the project. It will take 11 weeks to complete and must be completed before activity 5 and after activity 3. Management is concerned that adding the activity will add 11 weeks to the project. Another stakeholder argues the time will be less than 11 weeks. Who is correct? Use the original information (without the change to activity 3 listed in the previous question) to answer this question.
7. Based on the information in the previous question, how much longer will the project take?

Answer

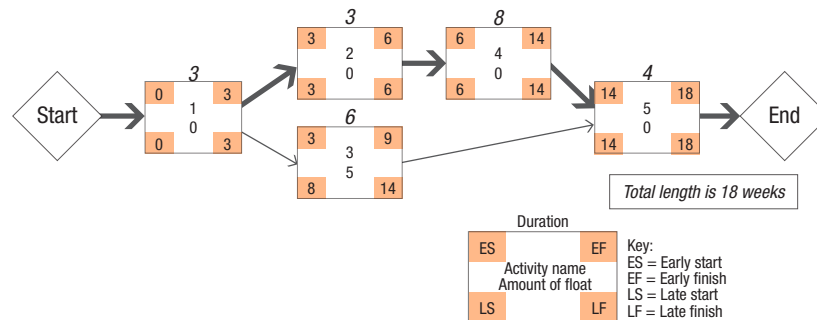
There are many ways to answer these questions. If you learned another way in other project management training and are comfortable with that method, use it. Here is a simple way to compute the answers.

1. The length of the critical path is 18. There are two paths here:



Start, 1, 2, 4, 5, End is the longest duration path and is therefore the critical path at 18 weeks.

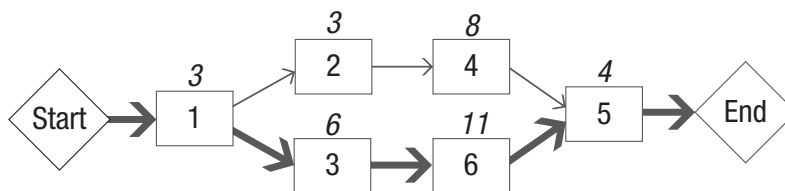
2. The float of activity 3 is 5 weeks, per the following diagram, which shows how to calculate float using the forward and backward pass.



You can use either float formula to compute float:

- Late finish – Early finish = 14 – 9 = 5, or
- Late start – Early start = 8 – 3 = 5.

- The float of activity 2 is zero; it is on the critical path. An activity on the critical path generally has no float.
- The float of the path with the longest float is 5 weeks. There are only two paths in this example:
 - Start, 1, 2, 4, 5, End and Start, 1, 3, 5, End.
 - Only the non-critical path (Start, 1, 3, 5, End) will have float.
 - You can calculate the float for this path by adding the float for each activity: 0 + 5 + 0 = 5.
 - Therefore, the total float of the path with the longest float is 5.
- The resource change on activity 3 will have no effect.
 - The length of path activities 1, 3, and 5 is 13.
 - Adding 4 more weeks to the length of activity 3 will make that path 17.
 - Since that path is still shorter than the critical path, the critical path does not change.
 - The length of the critical path is still 18 weeks because activity 3 is not on the critical path.
- The stakeholder who says the time added to the project will be less than 11 weeks is correct.
 - The new activity will be added to a non-critical path that has a float of 5 weeks.
 - Therefore, adding 11 weeks will make this path the new critical path.
 - The effect of adding an activity that takes 11 weeks is a delay to the project of 6 weeks.
- The project will take 6 weeks longer. (Note: If you answered 24, you did not read the question correctly!) Follow the bold arrows in the following diagram.



Note: If you want more practice, there is an extra float and critical path exercise on the RMC Resources page (rmcls.com/rmc-resources).