

# Task Types and How They Affect the Schedule

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In this article I will explain task types and how do they reflect on a Schedule in MICROSOFT PROJECT.

Basically, there are three Task Types:

1. *Fixed Units (Default)*
2. *Fixed Work*
3. *Fixed Duration*

What are those?

1. *Units or Assignment units.* It reflects Resource availability on the Task. 100% means full time, 50% means half time etc.
2. *Work.* This is amount of time (hours, days, weeks...) that a resource will work on the Task
3. *Duration.* This is the time span from the start to the finish date of the Task.

Above this three Task types, all of them can be *Effort* or *Non-effort driven*! What is the difference? Suppose that you have two Tasks on your Project.

- *Task 1 = Reading the book.* If one person is assigned to that Task and it needs 2 days (for example), and you assign another resource to that Task, it will still take 2 days for each person to read that book. You cannot reduce the Task duration on that Task by adding more resources to it. This is a *Non-effort driven Task*.
- *Task 2 = Painting the wall.* If one person is assigned to that Task and it needs 2 days (for example), and you assign another resource to that Task, it will take a shorter duration to complete that task. You reduce the Task duration on that Task by adding more resources to it. This is an *Effort driven Task*.

## **Now, you MUST REMEMBER THE MAGIC FORMULA**

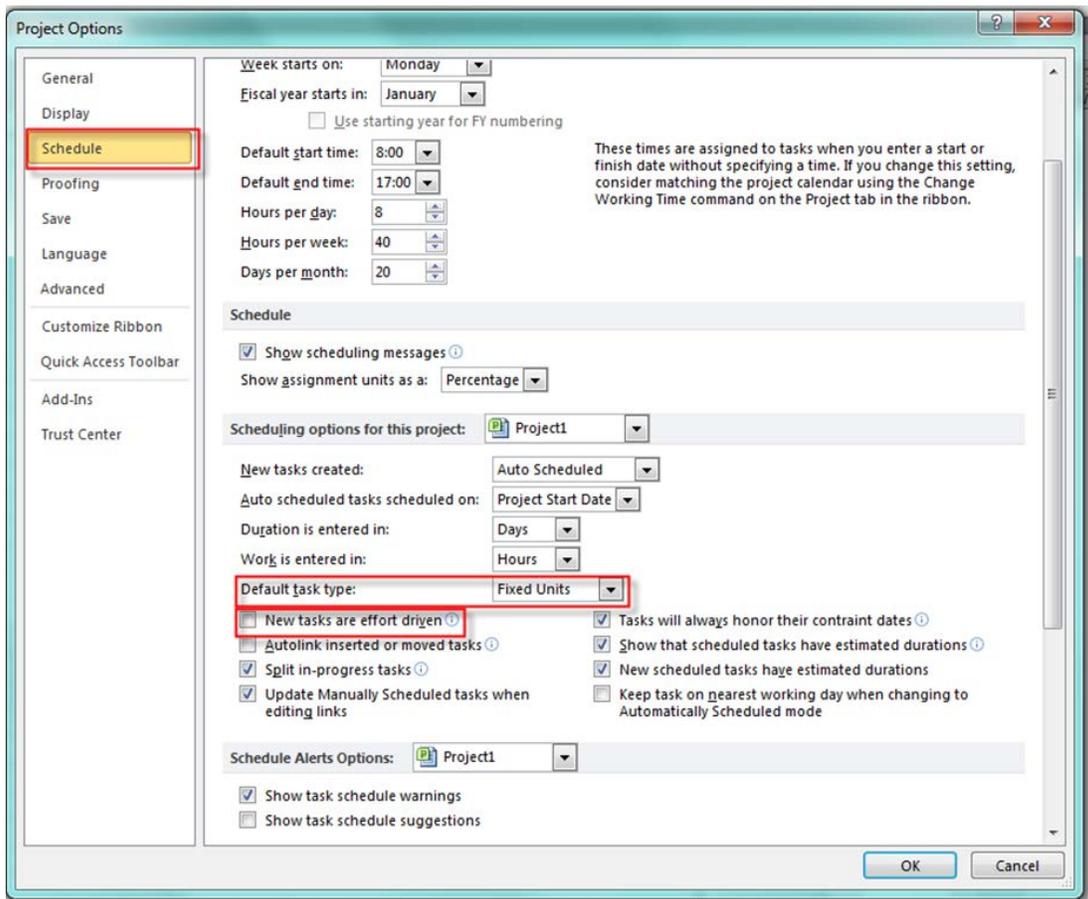
DURATION × UNITS = WORK

In **MICROSOFT PROJECT** when you add a new Task to the Project, and/or assign a new Resource to it, the default type is: *Non-effort driven, fixed Units* Task!

You can change this default settings for your Project:



and then:



I will leave everything “AS IS”!

Now I will describe what will happen if I change something in the Magic Formula:

TASK TYPE	If you change: ASSIGNMENT UNITS	If you change: WORK	If you change: DURATION
FIXED UNITS	Changed: DURATION Unchanged: WORK	Changed: DURATION Unchanged: UNITS	Changed: WORK Unchanged: UNITS
FIXED WORK	Changed: DURATION Unchanged: WORK	Changed: DURATION Unchanged: UNITS	Changed: DURATION
FIXED DURATION	Changed: WORK Unchanged: DURATION	Changed: WORK Unchanged: DURATION	Changed: WORK

**FIXED WORK is always EFFORT DRIVEN!**

Where do Effort or Non-effort driven tasks come “in action”? When you assign or remove additional resource to the Task:

TASK TYPE	ADD OR REMOVE RESOURCES (UNITS)
FIXED UNITS – non-effort driven	Changed: WORK Unchanged: DURATION, and UNITS
FIXED UNITS – effort driven	Changed: WORK and DURATION Unchanged: UNITS
FIXED WORK – effort driven* * Fixed Work is always effort driven	Changed: DURATION Unchanged: WORK, and UNITS
FIXED DURATION – non-effort driven	Changed: Work Unchanged: DURATION, and UNITS
FIXED DURATION – effort driven* * Can only modify existing resources	Changed: WORK Unchanged: DURATION, and UNITS

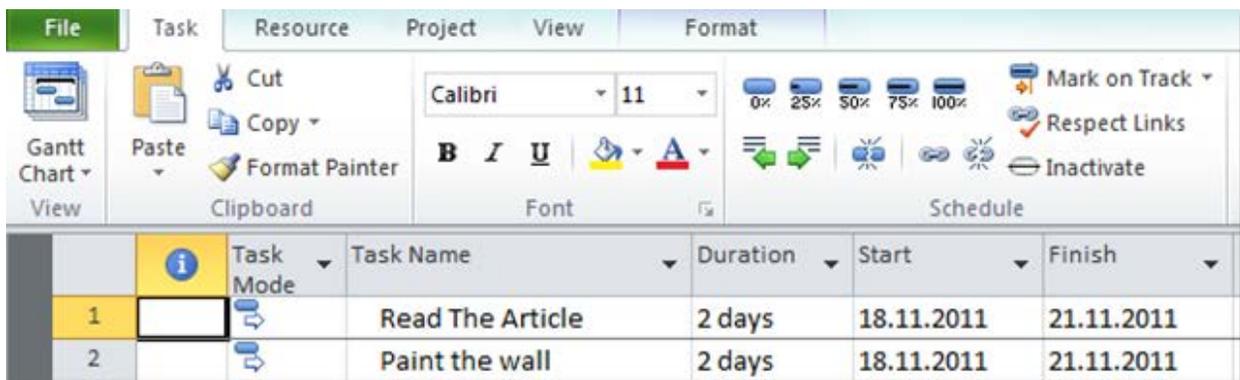
**When Should a Task HAVE Fixed Units?** This is the default type and protects your resource from working more than he or she should. If a resource is assigned to the Task at 50%, whatever you change on the task, this resource will work only 50% of his capacity on that Task!

**When Should a Task HAVE Fixed Work?** When you assign a resource to the Task, the task's duration is translated to the work. If you want to keep those hours constant when you change duration or work for the Task, choose this Task type!

**When Should a Task HAVE Fixed Duration?** Very simple! If you want the work on the task to be conducted within a fixed duration, you will choose this task type, and its duration will not be changed when you change units or work on the task.

First we will do a Setup!

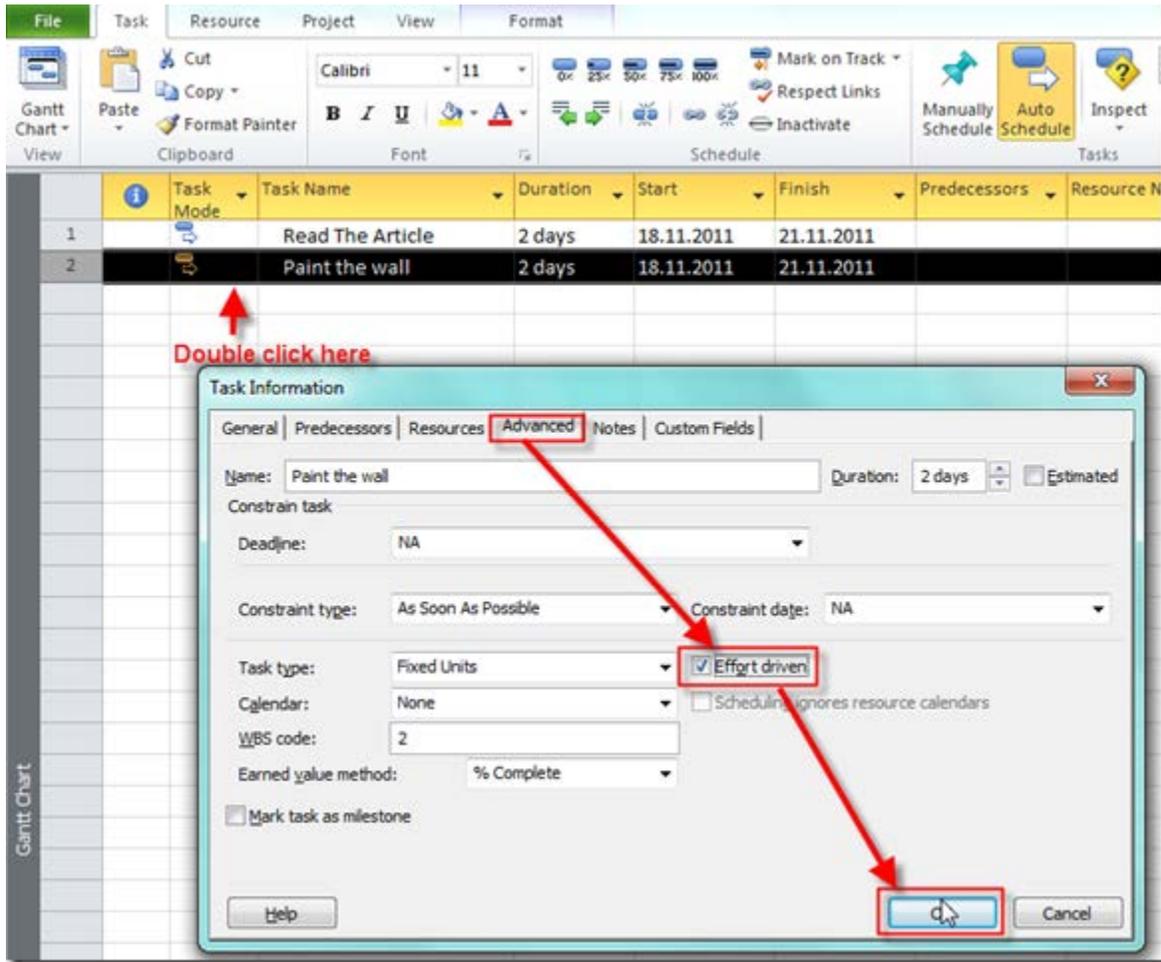
I will add two Tasks to my Project:



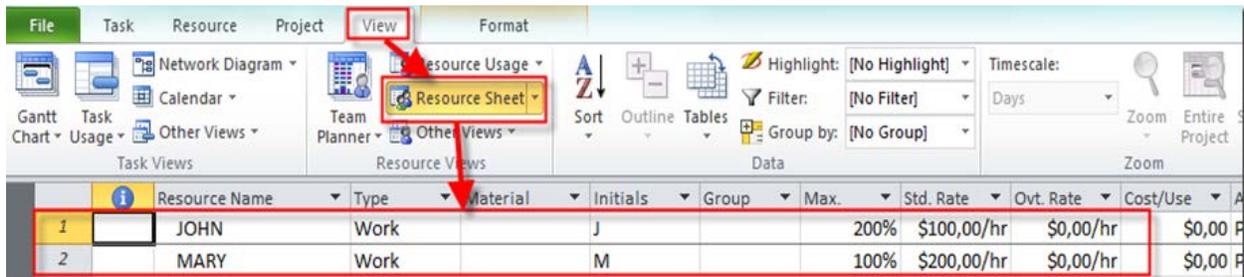
The screenshot shows the Microsoft Project software interface. The ribbon at the top includes 'File', 'Task', 'Resource', 'Project', 'View', and 'Format'. The 'Task' ribbon is active, showing options like 'Gantt Chart View', 'Paste', 'Format Painter', 'Clipboard', 'Font' (with options for Calibri, 11, Bold, Italic, Underline, and text color), and 'Schedule' (with options for 0%, 25%, 50%, 75%, 100%, Mark on Track, Respect Links, and Inactivate).

	Task Mode	Task Name	Duration	Start	Finish
1		Read The Article	2 days	18.11.2011	21.11.2011
2		Paint the wall	2 days	18.11.2011	21.11.2011

I will make *Paint the wall* effort driven:



Now I will add two Resource to the Project: *John* and *Mary*!



I will assign *John* to the *Read the article* Task and *Mary* to the *Paint the wall* Task.

Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	Read The Article	2 days	18.11.2011	21.11.2011		JOHN
2	Paint the wall	2 days	18.11.2011	21.11.2011		MARY

Finally I will set the Views. First *Task Usage*:

Task Name	Work	Duration	Start	Finish	Details	21 Nov '11
Read The Article	16 hrs 2 days	18.11.2011	21.11.2011	Work	T	8h
JOHN	16 hrs	18.11.2011	21.11.2011	Work		8h
Paint the wall	16 hrs 2 days	18.11.2011	21.11.2011	Work		8h
MARY	16 hrs	18.11.2011	21.11.2011	Work		8h

and now:

**Task Form**

Name:  Duration:   Effort driven  Manually Scheduled

Start:  Finish:  Task type:  % Complete:

ID	Resource Name	Work	R/D	Leveling Delay	Delay	Scheduled Start	Scheduled Finish

**You will get this screen!  
Click anywhere on it!**



I will click on the *Read the Article* Task and I will get:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	16h	0h	0h	0h	16h

As you can this Task has: *Duration = 2 days*, it is *non-effort driven*, *fixed units* it has 100% units, and *Work = 16 hours*.  $Work = Duration \times Units \rightarrow Work = 2 \text{ days (8 hours per day)} \times 100\% = 16 \text{ hours} \times 100\% = 16 \text{ hours}$ .

I will change Units from 100% to 150%:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	150%	24h	0h	0h	0h	16h

and I will get:

Task ID	Task Name	Work	Duration	Start	Finish
1	Read The Article	16 hrs	1,33 days	18.11.2011	21.11.2011
	JOHN	16 hrs		18.11.2011	21.11.2011
2	Paint the wall	16 hrs	2 days	18.11.2011	21.11.2011
	MARY	16 hrs		18.11.2011	21.11.2011

Task Name	Duration	Start	Finish
Read The Article	1,33 days	18.11.2011	21.11.2011
Paint the wall	2 days	18.11.2011	21.11.2011

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	150%	16h	0h	0h	0h	16h

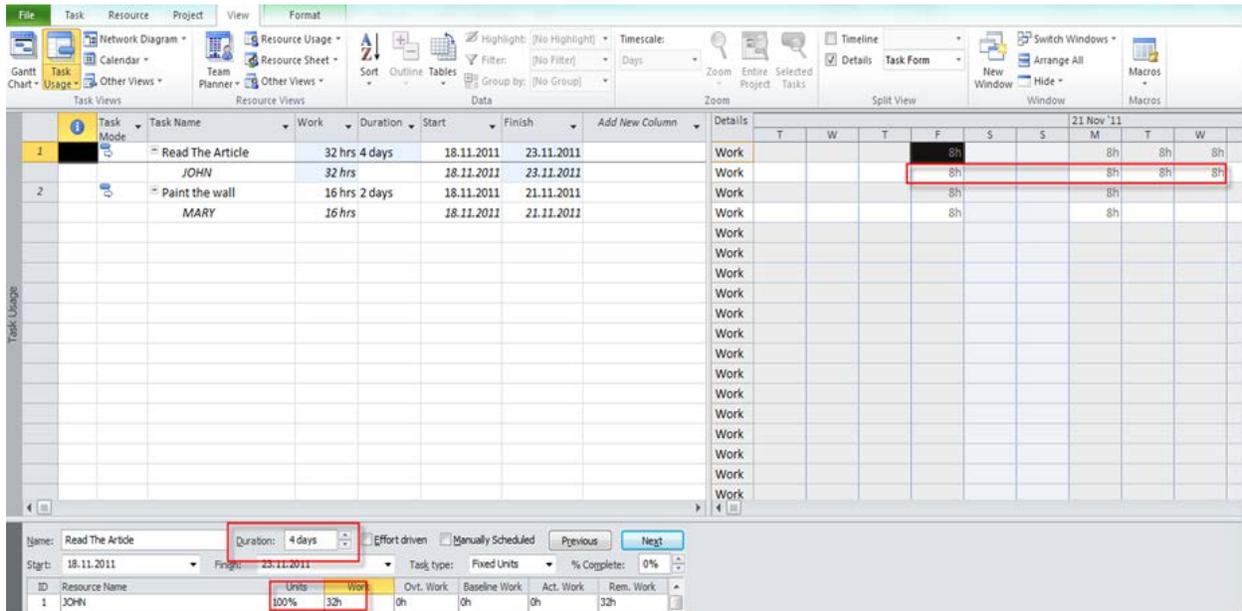
Work is same = 16 hours! Because John can work with 150% capacity, he will work  $8 \times 150\% = 12$  hours at first day, and remaining 4 hours at second day, to fulfill 16 hours! But why is Duration=1.33 days? It seem it should be 1.5 day (because John will work only 4 hours at second day, instead of 8)! Well here is the explanation! Because I put 150% in Unit, MS PROJECT assumes that John has to work 12 hours / day ( $150\% \times 8$  hours= 12 hours). And the Duration is calculated: 12 hours on first day = 1 day! 4 hours on second day ( $4/12$ ) = 0.33, and total is =  $1 + 0.33 = 1.33$

OK. Now I will go back to the initial Setup:

The screenshot displays the Microsoft Project interface. The top ribbon includes File, Task, Resource, Project, View, and Format. The 'Task' ribbon is active, showing options like Network Diagram, Calendar, and Task Usage. The main area shows a task list with columns for Task Name, Work, Duration, Start, and Finish. The task 'Read The Article' is highlighted, and its details are shown in the bottom pane. The task type is set to 'Fixed Units' and the duration is 2 days. The resource 'JOHN' is assigned with 100% units and 16 hours of work.

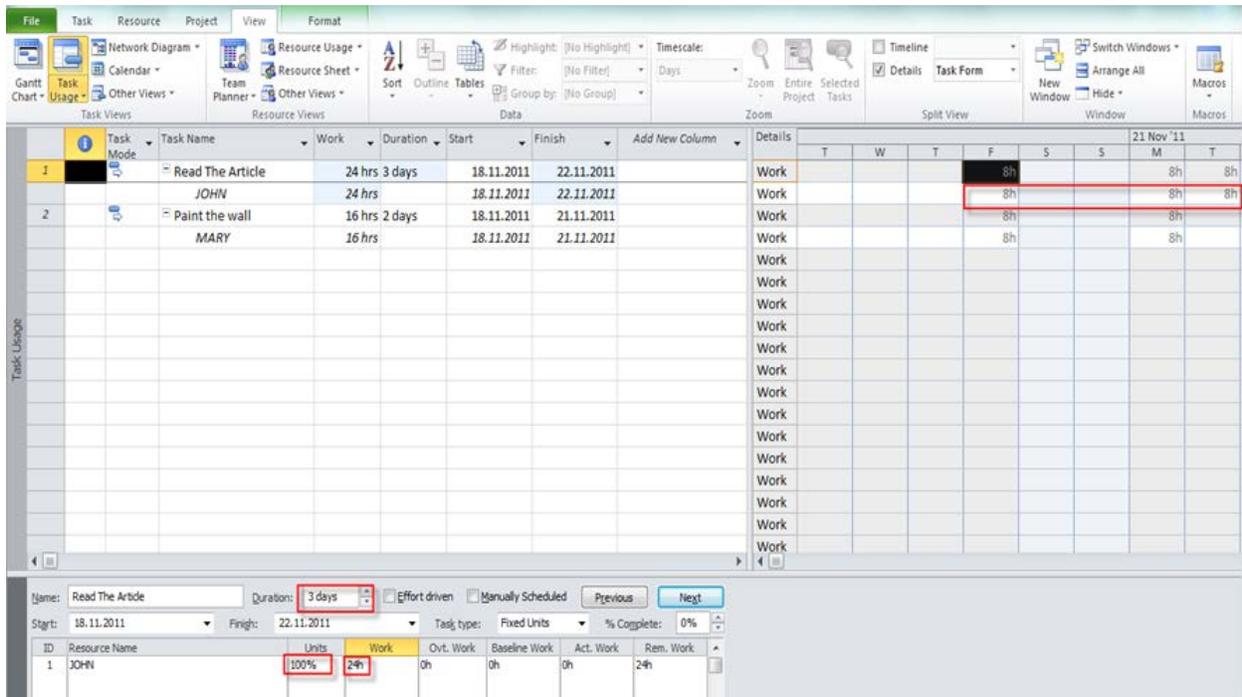
ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	16h	0h	0h	0h	16h

and I will change *Work* to 32 hours, click on OK button, and I will get:



*Work* is 32 hours! Because Task is *Fixed Units*, John will work with 100% capacity. The Magic Formula is  $Work = Duration \times Units$ , and that means  $32 = Duration \times 100\%$ . Because 1 day has 8 working hours It will be  $32/8 = 4$  days in the *Duration* field.

Finally I will (from initial setup) change the *Duration* from 2 to 3 days, click on the OK button, and I will get:



Duration is 3 days! Because Task is *Fixed Units*, John will work with 100% capacity. The Magic Formula is  $Work = Duration \times Units$ , and that means  $Work = 3 \text{ days (8 hours per day)} \times 100\% = 24 \text{ hours}$ .

Continuing on with *Task Types*. I will set the Task: *Read the Article* as *Fixed Work*:

The screenshot displays a Gantt Chart interface with two tasks listed:

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	Read The Article	2 days	18.11.2011	21.11.2011		
2	Paint the wall	2 days	18.11.2011	21.11.2011		

Below the Gantt Chart, the task details for 'Read The Article' are shown:

- Name: Read The Article
- Duration: 2 days
- Effort driven
- Manually Scheduled
- Start: 18.11.2011
- Finish: 21.11.2011
- Task type: Fixed Work
- % Complete: 0%

A resource table is also visible below the task details:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work

As you can see, this task type is always *Effort driven*. I will assign *John* to this Task, and I will get:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	16h	0h	0h	0h	16h

First I will change the *Units* field from 100% to 150%, and I will get:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	150%	16h	0h	0h	0h	16h

Work is same = 16 hours! Because John can work with 150% capacity, he will work  $8 \times 150\% = 12$  hours at first day, and remaining 4 hours at second day, to fulfill 16 hours! But why is Duration=1.33 days? It seem it should be 1.5 day (because John will work only 4 hours at second day, instead of 8)! Well here is the explanation! Because I put 150% in Unit, MS PROJECT assumes that John has to work 12 hours / day ( $150\% \times 8$  hours= 12 hours). And the Duration is calculated: 12 hours on first day = 1 day! 4 hours on second day ( $4/12$ ) = 0.33, and total is =  $1 + 0.33 = 1.33$

OK. Now I will go back to the initial Setup:

The screenshot displays the Microsoft Project interface. The top part shows a task list with the following data:

ID	Task Name	Work	Duration	Start	Finish
1	Read The Article	16 hrs	2 days	18.11.2011	21.11.2011
	JOHN	16 hrs		18.11.2011	21.11.2011
2	Paint the wall	16 hrs	2 days	18.11.2011	21.11.2011
	MARY	16 hrs		18.11.2011	21.11.2011

The bottom part shows the task details for 'Read The Article':

- Name: Read The Article
- Duration: 2 days
- Effort driver:
- Manually Scheduled:
- Start: 18.11.2011
- Finish: 21.11.2011
- Task type: Fixed Work
- % Complete: 0%

The resource allocation table at the bottom is as follows:

ID	Resource Name	Units	Work	Ovt. Work	Baseline work	Act. Work	Rem. Work
1	JOHN	100%	16h	0h	0h	0h	16h

and I will change *Work* to 32 hours, click on OK button, and I will get:

The screenshot shows the Microsoft Project interface. The task list on the left includes 'Read The Article' (JOHN) with a duration of 32 hrs 4 days and 'Paint the wall' (MARY) with a duration of 16 hrs 2 days. The task details pane on the right shows a Gantt chart for 'Read The Article' with work bars for 8 hours on Friday, 8 hours on Monday, 8 hours on Tuesday, and 8 hours on Wednesday. The bottom task information pane shows 'Name: Read The Article', 'Duration: 4 days', 'Start: 18.11.2011', 'Finish: 23.11.2011', and 'Task type: Fixed Work'. The resource usage table at the bottom shows 100% units and 32h work for resource JOHN.

*Work* is 32 hours! The Magic Formula is  $Work = Duration \times Units$ , and that means  $32 = Duration \times 100\%$ . Because 1 day has 8 working hours It will be  $32/8 = 4$  days in the *Duration* field.

Finally I will (from initial setup) change the *Duration* from 2 to 3 days, click on the OK button, and I will get:

The screenshot shows the Microsoft Project interface after changing the duration. The task list on the left shows 'Read The Article' (JOHN) with a duration of 16 hrs 3 days. The task details pane on the right shows a Gantt chart for 'Read The Article' with work bars for 5.33h on Friday, 5.33h on Monday, and 5.33h on Tuesday. The bottom task information pane shows 'Name: Read The Article', 'Duration: 3 days', 'Start: 18.11.2011', 'Finish: 22.11.2011', and 'Task type: Fixed Work'. The resource usage table at the bottom shows 100% units and 16h work for resource JOHN.

Because we have *Fixed work*, and the *Duration* is 3 days instead of 2, MICROSOFT PROJECT will divide 16 hours (*Fixed work*) with 3 days and,  $16/3 = 5.33$  hours per day.

Now I will set the Task as a *Fixed Duration* type:

The screenshot displays the Microsoft Project interface. The 'Task Usage' view is active, showing a task named 'Read The Article' with a duration of 2 days and 16 hours of work. The task is assigned to resource 'JOHN'. The task type is set to 'Fixed Duration'. The duration field is highlighted with a red box, and the task type dropdown is also highlighted with a red box. Below the task list, the task details pane shows the task name, start and finish dates, and task type. A table below the task details shows resource usage for 'JOHN' with 100% units and 16 hours of work.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	16h	0h	0h	0h	16h

I will now change *Units* from 100% to 150% and I will get:

The screenshot shows the Microsoft Project interface. The main task list has two tasks: 'Read The Article' (24 hrs 2 days) and 'Paint the wall' (16 hrs 2 days). The 'Read The Article' task is assigned to resource 'JOHN' with 150% units and 24 hours of work. The 'Paint the wall' task is assigned to resource 'MARY' with 16 hours of work. The Gantt chart shows the 'Read The Article' task starting on 18.11.2011 and finishing on 21.11.2011, with 12 hours of work on Friday and 12 hours on Monday. The resource usage table at the bottom shows 150% units and 24 hours of work for JOHN.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	150%	24h	0h	0h	0h	24h

Because the Magic Formula is:  $Work = Duration \times Units$ , and *Duration* is *Fixed*, it means:  $Work = 2 \text{ days} \times 150\% = 16 \text{ hours} \times 1.5 = 24 \text{ hours}$  in two days!

Now I will change *Work* to 32 hours, and I will get:

The screenshot shows the Microsoft Project interface after changing the work for the 'Read The Article' task to 32 hours. The task list shows 'Read The Article' (32 hrs 2 days) and 'Paint the wall' (16 hrs 2 days). The 'Read The Article' task is assigned to resource 'JOHN' with 100% units and 32 hours of work. The Gantt chart shows the 'Read The Article' task starting on 18.11.2011 and finishing on 21.11.2011, with 16 hours of work on Friday and 16 hours on Monday. The resource usage table at the bottom shows 100% units and 32 hours of work for JOHN.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	32h	0h	0h	0h	32h

As you can see, because *Duration* is fixed, John will have to work 32 hours in 2 days, and it means 16 hours per day! Finally I will change the *Duration field* from 2 to 3 days, and I will get:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	24h	0h	0h	0h	24h

The *Work* is now 24 hours, because 3 days duration mean  $3 \times 8$  hours = 24 hours.

You may have noticed that one part is missing. That is: “What does it have to do with *effort*, and *non-effort* driven tasks”.

Well it does, when you add additional resources to those tasks. I have two Tasks in my example: *Read The Article*, which is *non-effort* driven task, and *Paint the wall*, which is *effort* driven task.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	24h	0h	0h	0h	24h

and

The screenshot shows the Microsoft Project interface. The main task list has two tasks: 'Read The Article' (24 hrs, 3 days) and 'Paint the wall' (16 hrs, 2 days). The 'Paint the wall' task is selected, and its details pane is open at the bottom. In the details pane, the 'Effort driven' checkbox is checked and highlighted with a red box. A red arrow points from the 'Paint the wall' task in the main list to this checkbox. The task name is 'Paint the wall', duration is '2 days', and the task type is 'Fixed Units'. The resource list below shows 'MARY' with 100% units and 16h work.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
2	MARY	100%	16h	0h	0h	0h	16h

Notice that both task are *Fixed Units*.

Now I will add *Mary* to the *Read The Article* Task, and I will get:

The screenshot shows the Microsoft Project interface with the 'Read The Article' task selected. The task details pane at the bottom shows the task name 'Read The Article', duration '3 days', and task type 'Fixed Units'. The resource list below shows two resources: 'JOHN' and 'MARY', both with 100% units and 24h work. The 'Work' column for 'MARY' is highlighted with a red box. The main task list shows 'Read The Article' with a total duration of 48 hrs and 3 days, and 'Paint the wall' with 16 hrs and 2 days. The resource usage grid on the right shows work for 'JOHN' and 'MARY' on the task 'Read The Article'.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	24h	0h	0h	0h	24h
2	MARY	100%	24h	0h	0h	0h	24h

Because this is *Non-effort driven task*, John and Mary must work 3 days, and that means 8 hour per day, which is 24 hours. So the total work for this task will take 48 hours (24 from Mary, and 24 from John). So, when you have a *Fixed units, non-effort driven Task*, and you assign new resource to the task, *Work* is changed, and *Duration* and *Units* are unchanged.

Now I will add *John* to the *Paint the wall* Task, and I will get:

The screenshot displays the Microsoft Project interface. The main task list shows 'Paint the wall' with a duration of 16 hrs 1 day, starting and finishing on 18.11.2011. It is assigned to two resources: JOHN (8 hrs) and MARY (8 hrs). The task is marked as 'Effort driven'. The resource usage table at the bottom shows that both resources are at 100% units, with 8 hours of work each.

ID	Resource Name	Units	Work	Ov't. Work	Baseline Work	Act. Work	Rem. Work
2	MARY	100%	8h	0h	0h	0h	8h
1	JOHN	100%	8h	0h	0h	0h	8h

Because this task is *effort driven*, and the *Task type* is *Fixed units*, both *Duration* and *work* are changed, and *Units* are unchanged. That means, that when I assign additional resource (John) to the Task, both John and Mary will have to work less hours in total, and Duration will be shorter.

Now I will undo those changes to get the initial setup, with one resource per task, but I will change both tasks to the *Fixed Work* type. And, because *Fixed work is always effort driven* I will give you just one example:

The screenshot shows a Gantt Chart with two tasks. The task details pane for 'Read The Article' is open, showing the following settings:

- Name: Read The Article
- Duration: 3 days
- Start: 18.11.2011
- Finish: 22.11.2011
- Task type: Fixed Work
- % Complete: 0%
- Effort driven:
- Manually Scheduled:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	24h	0h	0h	0h	24h

I will assign Mary to the *Read The Article* Task, and I will get:

The screenshot shows a Task Usage view with the following data:

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	12h	0h	0h	0h	12h
2	MARY	100%	12h	0h	0h	0h	12h

The task details pane for 'Read The Article' shows:

- Name: Read The Article
- Duration: 1,5 days
- Start: 18.11.2011
- Finish: 21.11.2011
- Task type: Fixed Work
- % Complete: 0%
- Effort driven:
- Manually Scheduled:

Because this task is *effort driven*, and the *Task type* is *Fixed work*, *Duration* is changed, and *Units* are unchanged. Why? *Work* is fixed, and it means that we have to spend 24 hours for it. When I assign Mary to the Task, it means that Both, Mary and John have to work 12 hours in total, to fulfill those 24 hours. And because *Units* are unchanged, it means that they can work max 8 hours per day. So, they will work 8 hours at first day, and 4 hours at second day to achieve 12 hours. The Magic Formula is:  $Work = Duration \times Units$ , so it means,  $12 = Duration (8 \text{ hours per day}) \times 100 = 12/8 = 1.5 \text{ day}$  per each person (John and Mary).

That means, that when I assign additional resource (Mary) to the Task, both John and Mary will have to work less hours in total, and *Duration* will be shorter.

Now I will undo those changes to get the initial setup, with one resource per task, but I will change both tasks to the *Fixed Duration* type.

The screenshot displays a Gantt Chart with two tasks:

ID	Task Name	Duration	Start	Finish	Resource Name
1	Read The Article	3 days	18.11.2011	22.11.2011	JOHN
2	Paint the wall	2 days	18.11.2011	21.11.2011	MARY

The task properties dialog for 'Read The Article' is shown below:

- Name: Read The Article
- Duration: 3 days
- Effort driven
- Manually Scheduled
- Start: 18.11.2011
- Finish: 22.11.2011
- Task type: Fixed Duration
- % Complete: 0%

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	24h	0h	0h	0h	24h

I will assign *Mary* to the *Read The Article* task, which is *non-effort driven*, and I will get:

The screenshot shows the 'Task Usage' view for the task 'Read The Article'. The task is assigned to two resources: JOHN and MARY. The duration is 3 days (48 hours). The work is split between the two resources: JOHN has 24 hours of work, and MARY has 24 hours of work. The task is marked as 'Effort driven' and 'Manually Scheduled'. The Gantt chart shows the task starting on 18.11.2011 and finishing on 22.11.2011. The resource usage grid shows that JOHN works 8 hours per day for 3 days, and MARY works 8 hours per day for 3 days. The summary row for the task shows a total work of 48 hours.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
1	JOHN	100%	24h	0h	0h	0h	24h
2	MARY	100%	24h	0h	0h	0h	24h

Because this is *Non-effort driven task*, John and Mary must work 3 days, and that means 8 hour per day, which is 24 hours. So the total work for this task will take 48 hours (24 from Mary, and 24 from John). So, when you have a *Fixed duration, non-effort driven Task*, and you assign new resource to the task, *Work* is changed, and *Duration* and *Units* are unchanged.

Now I will add *John* to the *Paint the wall* Task, and I will get:

The screenshot shows the 'Task Usage' view for the task 'Paint the wall'. The task is assigned to two resources: MARY and JOHN. The duration is 2 days (16 hours). The work is split between the two resources: MARY has 8 hours of work, and JOHN has 8 hours of work. The task is marked as 'Effort driven' and 'Manually Scheduled'. The Gantt chart shows the task starting on 18.11.2011 and finishing on 21.11.2011. The resource usage grid shows that MARY works 8 hours per day for 2 days, and JOHN works 8 hours per day for 2 days. The summary row for the task shows a total work of 16 hours.

ID	Resource Name	Units	Work	Ovt. Work	Baseline Work	Act. Work	Rem. Work
2	MARY	100%	8h	0h	0h	0h	8h
1	JOHN	100%	8h	0h	0h	0h	8h

Because this task is *effort driven*, and the *Task type* is *Fixed duration*, *Work* is changed, and *Units*, and *Duration* are unchanged. That means, that when I assign additional resource (John) to the Task, both John and Mary will have to work less hours per day, and Duration will be the same.

That is it.