	Requirement	Analysis	Design	Coding	Unit Testing	Integration Testing	System Testing	Field	Total
Requirement	50								50
Analysis	77	34							111
Design	13	39	102						154
Coding	26	31	65	344					466
Unit Testing	22	7	3	99	4				135
Integration Testing	22	6	2	55	_	3			88
System Testing	5	5	4	44	_	_	3		61
Field	2	2	1	9	_	_	_	2	16
Total	217	124	177	551	4	3	3	2	1081

1. Defect Removal for every phase :

Product size= 39KLOC

Therefore, Defect removal rate= Defects removed/39KLOC

Phase	Defect Removal Rate
Requirement	50/39KLOC = 1.28
Analysis	111/39KLOC = 2.84
Design	154/39KLOC = 3.98
Coding	466/39KLOC = 11.9
Unit Testing	135/39KLOC = 3.46
Integration Testing	88/39KLOC = 2.25
System Testing	61/39KLOC = 1.56
Total	27.27

2. Defect Injection Rate for every phase:

Defect Injection rate = Defects injected/39KLOC

Phase	Defect Injection rate
Requirement	217/39KLOC = 5.56
Analysis	124/39KLOC = 3.17
Design	177/39KLOC = 4.53
Coding	551/39KLOC = 14.1
Unit Testing	4/39KLOC = 0.10
Integration Testing	3/39KLOC = 0.07
System Testing	3/39KLOC = 0.07
Total	27.6

3. Defects Escape Rate for every phase:

Defect escape rate = Defects escaped from previous step/39KLOC

Requirement phase: Defects escaped from previous step= **0**

Analysis phase: Defects escaped from previous step= **217**

Design phase: Defects escaped from previous step= 217+124-111-50= **180**

Coding phase: Defects escaped from previous step=217+124+177-50-111-154= **203**

Unit phase: Defects escaped from previous step= 217+124+177+551-50-111-154-466= **291**

Integration phase: Defects escaped from previous step= 217+124+177+551-50-111-154-466-135 = **157**

System phase: Defects escaped from previous step= 217+124+177+551-50-111-154-466-135-88 = **72**

Field: Defects escaped from previous step= 217+124+177+551-50-111-154-466-135-88-61= **14**

Phase	Defect Escape Rate
Requirement	-----
Analysis	217/39KLOC= 5.56
Design	180/39KLOC= 4.61
Coding	203/39KLOC= 5.20
Unit Testing	288/39KLOC= 7.38
Integration Testing	157/39KLOC= 4.02
System Testing	72/39LOC= 1.84

4. /*Defect Removal Effectiveness for each development step = [Defects removed/Defect existing on step entry+ Defects injected during development] * 100%

Requirement phase= [50/0+217]*100% = 23%

Analysis phase= [111/(217+124)]*100% = 32.5%

Design phase= [154/(124+177)]*100% = 51%

Coding phase= [335/(177+551)]*100% = 53.5%

***/**

Defect Removal Effectiveness for Testing phases= [Defects removed (current step)/ Defects removed at current phase+ Defects removed at subsequent phase]*100%

Unit Testing= [135/ (135+88+61+16)]*100%= 46.5%

Integration testing= [88/ (88+61+16)]*100%= 53.3%

System Testing= [61/ (61+16)]*100% = 79.2%

Therefore, the phase that is most effective in removing defects is **System Testing phase**.

5. Overall Defect Removal Effectiveness= [1-(16/1081)]*100%
   = (1-0.014) *100
   = 0.986
   = **98.6**%
6. Overall Inspection Effectiveness=[Defects removed by inspection/All defects]*100%
   = [(50+111+154+466)/1081]*100%
   = [781/1081]*100%
   = **72.24**%

Overall Test Effectiveness= [135+88+61/(135+88+61+16)]*100%
= [284/300]*100%
= **94.6**%

Thus, from the above calculations we can conclude that the reviews and inspections were effective as the overall defect removal effectiveness is 98.6% which is more than overall test effectiveness which is 94.6%.

7. The number of defects originated in the req phase is increased by 20%= 217+ (20% of 217)= 260

   The number of defects detected in the requirements review phase is increased by 50%=
   50+(10% of 50)= 75

   The difference between the two= 185

   Whereas the difference between the previous values (217 – 50) is 167.

   Hence, 185-167= 18

Therefore 18 defects will be carried down to the subsequent phases during which they might be detected or might not be.

Considering the worst case scenario, if the defects go undetected then there is a high risk of increase in the number of errors in the following phases, especially coding. Hence, there is a **negative impact** of the defects originated in the coding phase.

8. **Defect Removal Effectiveness for Testing phases= [Defects removed (current step)/ Defects removed at current phase+ Defects removed at subsequent phase]*100%**

Considering the above formulae to calculate the defect removal effectiveness for testing phases, it can be noticed that only defects removed at the subsequent changes can affect the defect removal effectiveness for testing phases. Hence any number of defects originated in the design phase or detected during the coding phase will not have any impact. Hence, there will be **no impact**.