Question 1:
Speeds are 2,3, and 5
Given the data that Route 1 is 5 km long. There is a 20% chance it is sandy, 30% chance it is smooth, and a 50% chance it is rocky.

Route 2 is 7 km long. There is a 40% chance it is sandy, a 20% chance it is smooth, and a 40 % chance it is rocky.

Route 3 is 6 km long. There is a 50% chance it is sandy, a 40% chance it is smooth, and a 10% chance it is rocky.

Time = distance/speed

Route 1: sandy terrain is 3km/h max with 20% chance so time on sandy is distance/speed which is ⅔ which is 0.6667 times 0.2 chance which is **0.1333**. Smooth is ⅖ which is 0.4 times 0.30 probability is **0.12**. Rocky is 2/2 times .50 probability which is **0.5** so the total time for route = **1.8833**

Route 2: distance is 7 so sandy is 7/3(0.4) = 0.24. Smooth is 1.8/5(0.2)=0.072. Rocky is 1.8/2(0.4)=0.36.=**2.6133**

Route 3: distance is 6 so sandy is 6 /3(0.5)=0.5167. Smooth is 3.1/ 5(0.4)=0.248. Rocky is 3.1/ 2(0.10)=0.155. The sum is **1.7800**

Route 3 is the quickest route

Question 1.1:

Route 1: if wall of crater is intact we can take shortcut to save 20 mins(70%) If wall is damaged (30% chance) we go around and add 15 mins.
1.833-0.33=1.55
1.833-0.25=2.133
=(0.70×1.55)+(0.30×2.1333)
=1.085+0.64
=1.725hours
Route 3: if bridge is damaged (60% chance) we repair the bridge and add 40 mins to the time. No additional time needed if the bridge is intact (40% chance)
1.788+0.66=2.4467
=(0.40×1.7800)+(0.60×2.4467)
=0.7120+1.4680
=2.1800hours

Route 1 is quickest in this scenario

Question 1.2:

Satellite says route 2 is not rocky:
Probability of sandy = ⅔, smooth = ⅓
Time without rocky:
Sandy = 2/33*66%=1.56
Smooth = 1.4*33%=0.47
Sum = 2.02 hours

Probability that satellite tells us:
p(not rocky):100-40=60
60% of being told its not rocky

Satellite tells us route 2 is rocky:
If we take route 2:
Time = 7/2=3.5
If we take alternative route:
Route 1 = 1.725
Optimal choice is alternative route

How long should we wait for satellite:
Satellite may report route 2 is not rocky with 60% probability in which case route 2 is expected to take 2.02 hours, satellite may report route 2 is rocky with 40% probability in which case we take route 1 with 1.725 hour travel time.
Travel time after report from satellite:(60%×2.0223hours)+(40%×1.725hours)
=(0.60×2.0223)+(0.40×1.725)
=1.2134hours+0.6900hours
=1.9034hours

It seems route 1 is optimal regardless if we wait or not..