Problem 4:

Rocky Terrain: 2 km/h
↳ $\frac{60}{2} = 30$ min/km

Sandy Terrain: 3 km/h
↳ $\frac{60}{3} = 20$ min/km

Smooth Terrain: 5 km/h
↳ $\frac{60}{5} = 12$ min/km

Route 1: 5 km

20% Sandy: $0.2 \times 20 = 4$ min
30% Smooth: $0.3 \times 12 = 3.6$ min
50% Rocky: $0.5 \times 30 = 15$ min
Time/km = $4 + 3.6 + 15 = 22.6$ min/km
total time = $22.6 \times 5 = 113$ min

Route 2: 7 km

40% Sandy: $0.4 \times 20 = 8$ min
20% Smooth: $0.2 \times 12 = 2.4$ min
40% Rocky: $0.4 \times 30 = 12$ min
Time/km = $8 + 2.4 + 12 = 22.4$ min/km

total time = $22.4 \times 7 = 156.8$ min

Route 3: 6 km

50% Sandy: $0.5 \times 20 = 10$ min
40% Smooth: $0.4 \times 12 = 4.8$ min
10% Rocky: $0.1 \times 30 = 3$ min
Time/km = $10 + 4.8 + 3 = 17.8$ min/km

total time = $17.8 \times 6 = 106.8$ min

Best rout is route 3
↳ which takes 106.8 min

Rout 1 with crater:

30% wall damage = +15 min
70% intact walls = −20 min
↳ $(0.3 \times 15) + (0.7 \times (-20)) = 4.5 - 14 = -9.5$ min

Route 1 updated time:
↳ $113 - 9.5 = \underline{103.5}$ min

Route 3 with bridge:

60% bridge damage = + 40 min
40% bridge intact = no change
↳ $(0.6 \times 40) + (0.4 \times 0) = 24$ min

Route 3 updated time:
↳ $106.8 + 24 = \underline{130.8}$ min

Route 1 = 103.5 min → best option
Route 2 = 156.8 min
Route 3 = 130.8 min

Route 2: Satelite → not Rocky
Adjusted sandy probability = $\frac{40}{40+20}$ $\frac{2}{3}$ = 66.7

Adjusted Smooth probability = $\frac{20}{40+20}$ = $\frac{1}{3}$ = 33.3

Sandy → $\frac{2}{3}$ × 20 = 13.33 min/km

Smooth → $\frac{1}{3}$ × 12 = 4 min/km

time per km = 13.33 + 4 = 17.33 min/km
total time = 17.33 × 7 = 121.3 min

What's the probability that
the satelite tells us this?
1 − P(rocky) = 1 − 0.4 = 60%

Satelite tells us its rocky

Route 2 → 100% rocky

$\frac{60}{2}$ = 30 min/km

total time = 30 × 7 = 210 min

We would never wait for the
satelite because Route 1
would be faster either way?