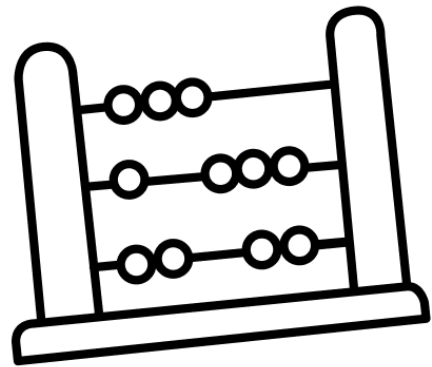


Cilmi-baaris hawleed (Operational research)

Maths

Unit Xisaab goobta shaqada



Natiijo

Waxaan fahmi karaa sida xisaabta loogu isticmaalo cilmi-baarista hawleed (operational research).

Saadka (Logistics) waa habayn taxaddar leh oo mashruuc adag (hawlo) ah si uu ugu dhaco si guul leh oo wax ku ool ah.

Cilmi-baaris hawleed (Operational research)



Baakadayn (Packing)



Qorshaynta mashruuc

Si ganacsi uu u noolaado, dakhligiisu waa inuu ka weyn yahay ama la mid yahay kharashkiisa.

Laakiin kaliya daboolida kharashka kuma ogolaan doonto ganacsiga inuu maalgeliyo ama horumariyo kheyraadka jira.

Sidaa darteed, haddii ganacsi uu yahay mid hufan (efficient), waxay u badan tahay inuu faa'iido (profit) sameeyo.

Aynu diiradda saarno diyaarinta alaabta gaadiidka. Si loo fududeeyo, waxaan diiradda saari doonnaa tiro yar oo alaab ah.

Xaqiiqda, shirkaduhu waxay la tacaalaan boqolaal ama kumanaan alaab.

Shirkad waxay u baahan tahay inay u dirto sagaal shay dukaan. Shayyada waa in lagu raraa sariir (pallet). Sariir (pallet) kuma qaadi karto wax ka badan 200 kg.

Waa kuwan cufnaanta (masses) (kg) ee shayyada:

30 70 80 80 100 110 110 120 150

Waa imisa tirada ugu yar ee sariiraha (pallets) loo baahan yahay?

Sariir (pallet) kuma qaadi karto wax ka badan 200 kg.

Waa kuwan cufnaanta (masses) (kg) ee shayyada:

30 70 80 80 100 110 110 120 150

Waxaan u baahan nahay afar pallet oo keliya si aan u qaadno alaabta.

Waxaan u malaynayaa inaan u baahan nahay shan pallet.

Yaa sax ah? Sidee ku ogaanaysaa?



Cabdi



Isra

Wadarta culeyska (mass) waa: $30 + 70 + 80 + 80 + 100 + 110 + 110 + 120 + 150 = 850$

850 loo qaybiyay 200 waa 4.25



4.25 waa la soo koobay
(rounds down) ilaa 4, marka
waa afar pallet.

Cabdi



Waxaan u baahanahay in ka
badan afar pallet, marka tirada
ugu yar ee aan u baahanahay
waa shan.

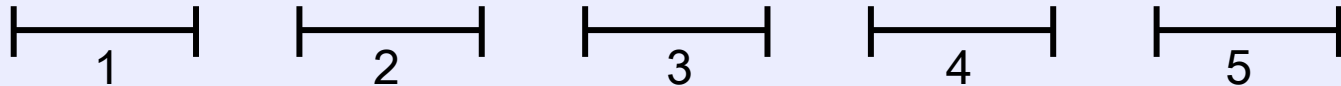
Isra

Pallet kuma qaadi karo wax ka badan 200 kg.

Waa kuwan culeysyada (masses) (kg) ee alaabta:

30 70 80 80 100 110 110 120 150

Go'aanso alaabta kee loo dhigo pallet-ka kee. Ma ku habboon kartaa alaabta shan pallet?

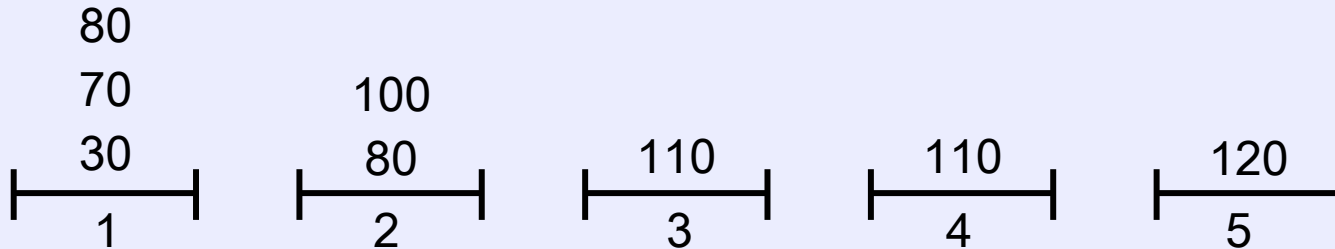


Pallet kuma qaadi karo wax ka badan 200 kg.

Waa kuwan culeysyada (masses) (kg) ee alaabta:

150 **X**

Cabdi wuxuu go'aansaday inuu alaab kasta dhigo pallet-kii ugu horreeyay ee qaadi kara.



Pallet kuma qaadi karo wax ka badan 200 kg.

Waa kuwan cufka (masses) (kg) ee alaabta:

Cabdi ayaa markale isku dayay, laakiin markan wuxuu ku bilaabay cufka ugu weyn.

$$\begin{array}{c} 30 \\ 150 \\ \hline 1 \end{array}$$

$$\begin{array}{c} 80 \\ 120 \\ \hline 2 \end{array}$$

$$\begin{array}{c} 80 \\ 110 \\ \hline 3 \end{array}$$

$$\begin{array}{c} 70 \\ 110 \\ \hline 4 \end{array}$$

$$\begin{array}{c} 100 \\ \hline 5 \end{array}$$

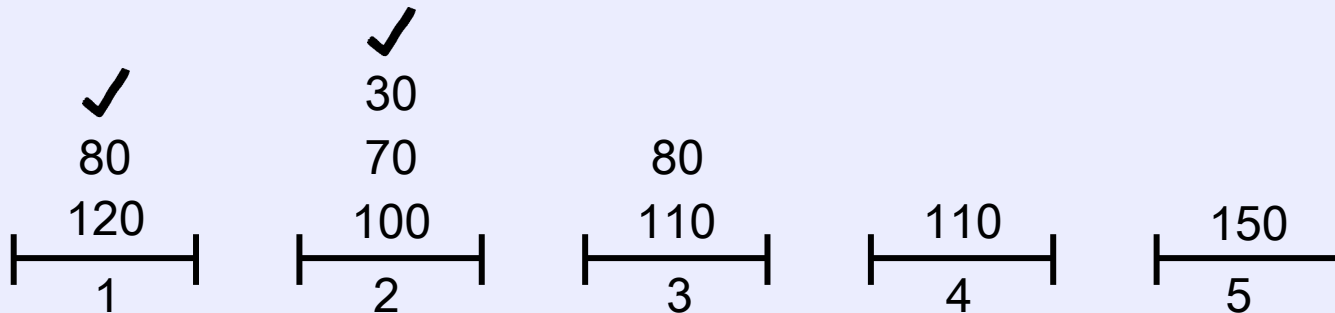


Baakadayn (Packing)

Pallet kuma qaadi karo wax ka badan 200 kg.

Waa kuwan cufka (masses) (kg) ee alaabta:

Isra ayaa isku soo ururisay cufka (masses) si ay u abuurto pallets 'buuxa'.

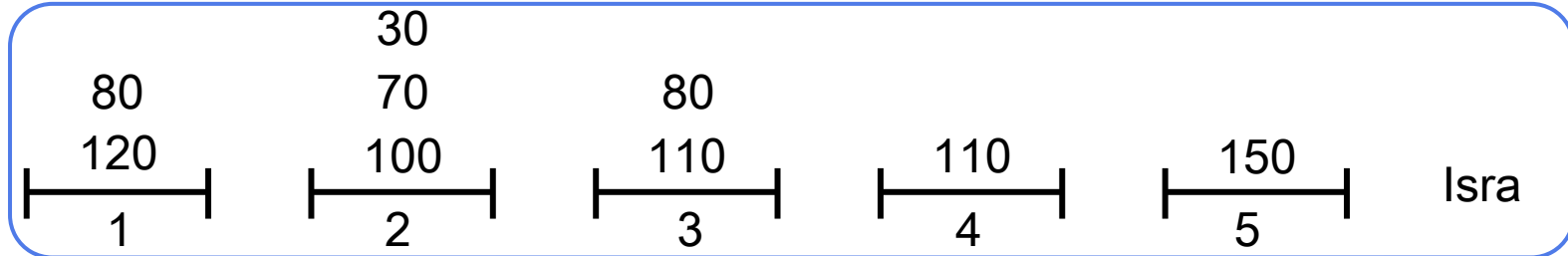
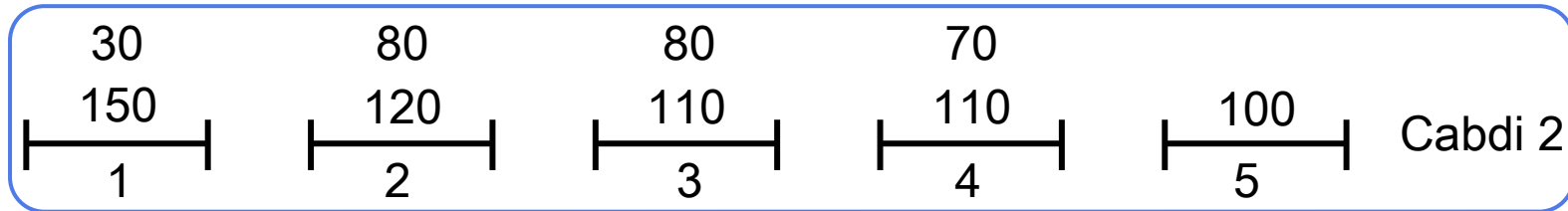
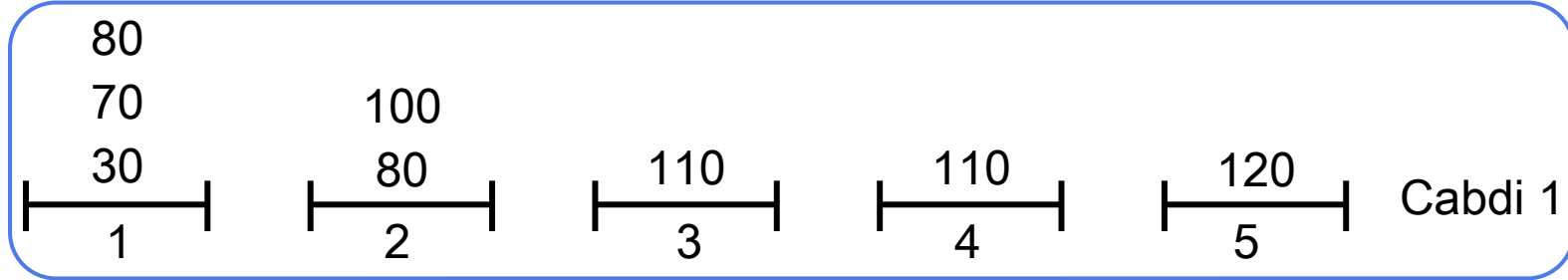


Baakadayn (Packing)

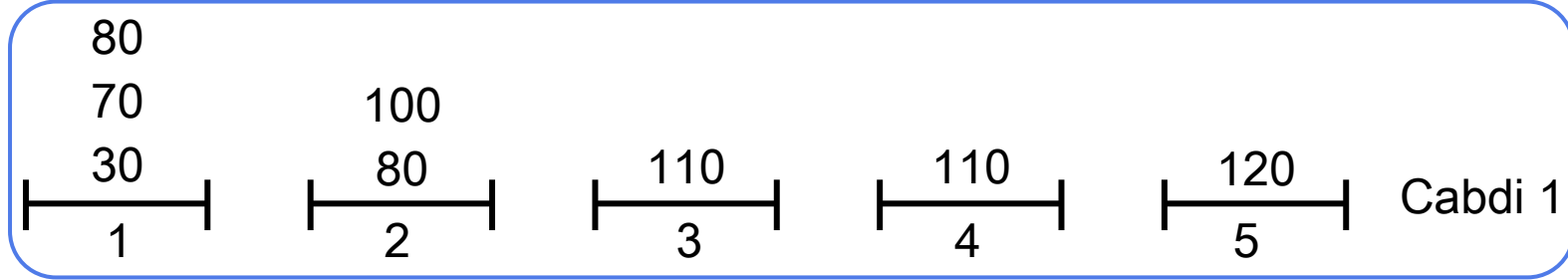


Sharaxaad

Saddexda hab (methods) midkee ayaad door bidaysaa?



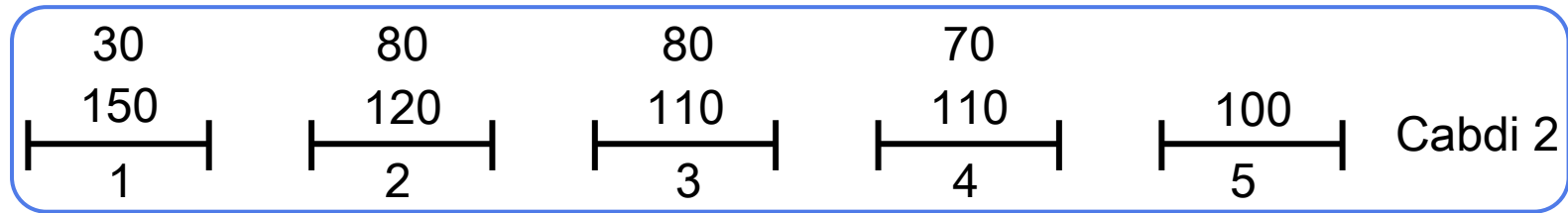
Saddexda hab (methods) midkee ayaad door bidaysaa?



Habka 1 aad buu u dhakhsaha badnaa laakiin kuma shaqayn qiimahan.

Baakadayn (Packing)

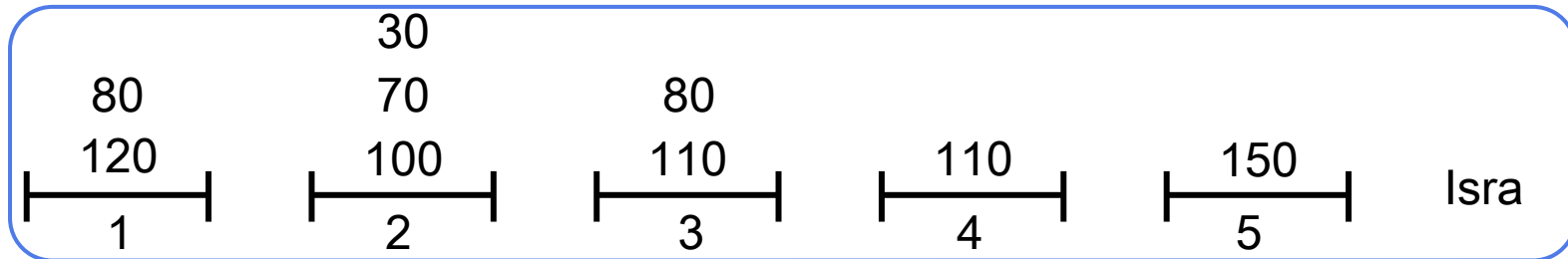
Saddexda hab (methods) midkee ayaad door bidaysaa?



Habka 2 wuu dhakhsaha badnaa wuxuuna keenay tiro la mid ah alaabta pallet kasta.

Saddexda hab (methods) midkee ayaad door bidaysaa?

Habka 3 wuxuu keenay pallets (pallets) oo aan ognahay in aan wax kale lagu saari karin.



Run mise been?

Waxaa jira hal hab oo hufan oo lagu baakadeeyo alaabta lagu qaado.



Run



Been



Waxay ku xiran tahay xannibaadaha (constraints) jira, sida cabbirka alaabta ama cabbirka sanduuqyada baakadaynta.

1) Doon ayaa gaadiidka u qaada wabiga. Doonku wuxuu leeyahay saddex waddo oo gaadiidku isticmaali karo. Waddo kastaa waa 30 m dherer.

Subax ka mid ah, gaadiidkani waxay yimaadaan sidan:

a) Adigoo raraya gaadiid kasta, marka uu yimaado, waddada ugu horreysa ee furan, ma awoodi doonaan dhammaan gaadiidku inay gudbaan? Caddee jawaabtaada.

Nidaamka imaatinka	Gaadiid	Dhererka (m)
1	gaari	4
2	gaari + xamaar	7
3	baabuur weyn	13
4	baabuur yar	6
5	baabuur weyn	13

Nidaamka imaatinka	Gaadiid	Dhererka (m)
6	gaari	4
7	baabuur weyn	12
8	baabuur weyn	14
9	baabuur (van)	6
10	gaari (lorry)	11

1) Doonye ayaa gaadiidka ku qaada webiga. Doonyuhu wuxuu leeyahay saddex waddo oo gaadiidku isticmaali karo. Waddo kastaa waa 30 m dherer.

Subax ka mid ah, gaadiidkani waxay yimaadaan sidan:

b) Adigoo tixgelinaya dhammaan gaadiidka (iyadoon loo eegin markay yimaadeen), ma lagu rari karaa dhammaan gaadiidka doonyaha? Caddee jawaabtaada.

c) Maxay tahay sababta jawaabtaada qayb b aysan macquul ahayn?

Nidaamka imaatinka	Gaadiidka	Dhererka (m)
1	gaari (car)	4
2	gaari + xamaar (car + trailer)	7
3	gaari (lorry)	13
4	baabuur (van)	6
5	gaari (lorry)	13

Nidaamka imaatinka	Gaadiidka	Dhererka (m)
6	gaari (car)	4
7	gaari (lorry)	12
8	gaari (lorry)	14
9	baabuur (van)	6
10	baabuur weyn (lorry)	11

2) Yacquub wuxuu kaydinayaa kombiyuutarkiisa. Wuxuu koobiaynayaa ciyaaraha (games) oo la gelayo USB sticks 32 GB ah. Cabbirka (size) ciyaar kasta waxaa lagu qoray jaantuska (table).

a) Yacquub wuxuu u malaynayaa inay suurtagal tahay in dhammaan ciyaaraha (games) lagu kaydiyo shan USB stick. Sharax sababta Yacquub u malayn karo tan iyo sababta uu u qaldan yahay.

Ciyaar (Game)	A	B	C	D	E	F	G	H
	USB sticks ee loo baahan yahay oo bixi milan (solution) suurtagal ah oo ah ciyaaraha (games) lagu kaydin doono USB stick kasta.							
Cabbir (Size) (GB)	8	13	17	21	22	24	25	25

1) Doon (ferry) ayaa qaadda gaadiidka (vehicles) webiga dushiisa. Doonta waxay leedahay saddex waddo (lane) oo gaadiidku isticmaali karo. Waddo kasta waxay dherer tahay 30 m.

Subax ka mid ah, gaadiidkan ayaa yimid sidan u kala horreeya:

Nambarka imaatinka (Arrival order)	Gaadiid (Vehicle)	Dherer (Length) (m)
1	baabuur (car)	4
2	baabuur + xamuul (car + trailer)	7
3	baabuur weyn (lorry)	13
4	gaari yar (van)	6
5	baabuur weyn (lorry)	13

Nambarka imaatinka (Arrival order)	Gaadiid (Vehicle)	Dherer (Length) (m)
6	baabuur (car)	4
7	baabuur weyn (lorry)	12
8	baabuur weyn (lorry)	14
9	gaari (van)	6
10	baabuur weyn (lorry)	11

a) Marka la raro gaari kasta, sida uu u yimaado, ee marinka ugu horreeya ee la heli karo, ma awoodi doonaan dhammaan gaadiidka inay gudbaan? Caddee jawaabtaada.

Nidaamka imaatinka (Arrival order)	Gaari (Vehicle)	Dhererka (m) (Length (m))
1	gaari (car)	4
2	gaari + xamaar (car + trailer)	7
3	baabuur weyn (lorry)	13
4	gaari (van)	6
5	baabuur weyn (lorry)	13

Nidaamka imaatinka (Arrival order)	Gaari (Vehicle)	Dhererka (m) (Length (m))
6	gaari (car)	4
7	baabuur weyn (lorry)	12
8	baabuur weyn (lorry)	14
9	gaari (van)	6
10	baabuur weyn (lorry)	14



Gaariga ugu dambeeya (lorry) ma gudbi karo marinka.

b) Adigoo tixgelinaya dhammaan gaadiidka (iyadoon loo eegin goortay yimaadeen), ma laga rari karaa dhammaan gaadiidka doonta? Sharax jawaabtaada.

Nidaamka imaatinka (Arrival order)	Gaadiid (Vehicle)	Dherer (m)
1	baabuur (car)	4
2	baabuur + xamaar (car + trailer)	7
3	gaari (lorry)	13
4	gaari yar (van)	6
5	gaari (lorry)	13

Nidaamka imaatinka (Arrival order)	Gaadiid (Vehicle)	Dherer (m)
6	baabuur (car)	4
7	gaari (lorry)	12
8	gaari (lorry)	14
9	gaari yar (van)	6
10	gaari (lorry)	12



11 14 13 4
6 12 13 4
11 14 13 4
6 12 13 4
11 14 13 4
6 12 13 4
11 14 13 4
6 12 13 4

Milan (solution) 11 suurtagal ah

c) Maxay jawaabtaada qaybta b u ah mid aan macquul ahayn?

Nidaamka imaatinka	Gaari (Vehicle)	Dhererka (m)
1	gaari	4
2	gaari + trailer	7
3	tareen (lorry)	13
4	baabuur yar (van)	6
5	tareen (lorry)	13

Tusaale: Gaadiidka laga yaabaa inaysan isku waqti imaanin.

Nidaamka imaatinka	Gaari (Vehicle)	Dhererka (m)
6	gaari	4
7	tareen (lorry)	12
8	tareen (lorry)	14
9	baabuur yar (van)	6
10	tareen (lorry)	11

Waxaa laga yaabaa inaysan suurtagal ahayn in gaadiidku is dhaafo safka.

2) Yacquub wuxuu kaydinayaa kombuyutarkiisa. Wuxuu koobiyeenayaa ciyaaraha (games) USB sticks oo 32GB ah. Cabbirka ciyaar kasta waxaa ku qoran jaantuska.

Game	A	B	C	D	E	F	G	H
Size (GB)	8	13	17	21	22	24	25	25

a) Yacquub wuxuu u malaynayaa inay suurtagal tahay in dhammaan ciyaaraha lagu kaydiyo shan USB sticks. Sharax sababta Yacquub u malayn karo taas iyo sababta uu u qaldan yahay.

$$8 + 13 + 17 + 21 + 22 + 24 + 25 + 25 = 155$$

$$155 \div 32 = 4.84375 \text{ Sidaa darteed shan USB sticks.}$$

Hase yeeshee waxaa jira lix ciyaarood oo cabbirkoodu ka weyn yahay badhka USB stick-ka. Ciyaarahan laguma kaydin karo wada, marka ugu yaraan lix USB stick ayaa loo baahan yahay.

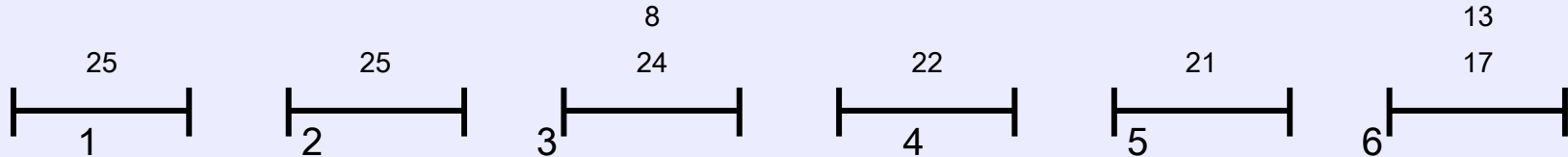
2) Jacob is backing up his computer. He is copying games onto 32GB USB sticks. The size of each game is listed in the table.

Game	A	B	C	D	E	F	G	H
Size (GB)	8	13	17	21	22	24	25	25

b) Sheeg tirada ugu yar ee USB sticks ee loo baahan doono oo bixi xal suurtagal ah oo ku saabsan cayaaraha lagu kaydin doono USB kasta.

Laba iyo afar USB ayaa loo baahan doonaa.

E.g.



Operational research



Packing



Planning a project

Marka la maareynayo mashruuc leh hawlo badan, waxaa faa'iido leh in lagu soo bandhigo jaantus (chart).

Tani waxay si gaar ah faa'iido u leedahay marka qaar ka mid ah hawlaha aysan bilaabi karin ilaa hawlo kale la dhammeeyo.

Planning a project



Sharaxaad

Tani waa tusaale jaantus noocaas ah:

Tirooyinka kor ku qoran waxay muujinayaan waqtiga. Tani waxay noqon kartaa daqiiqado/saacado/malmo iwm.

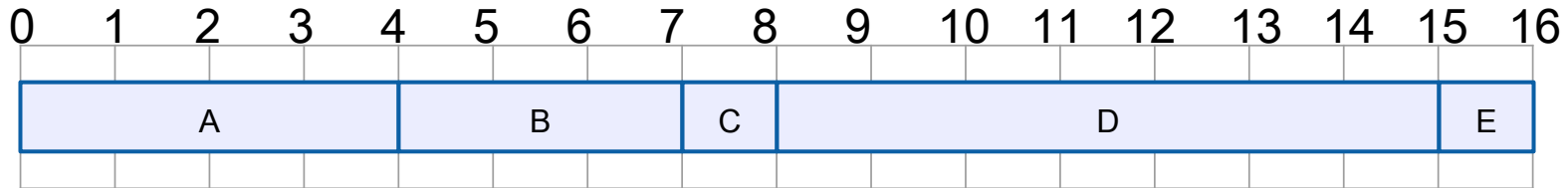
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Planning a project

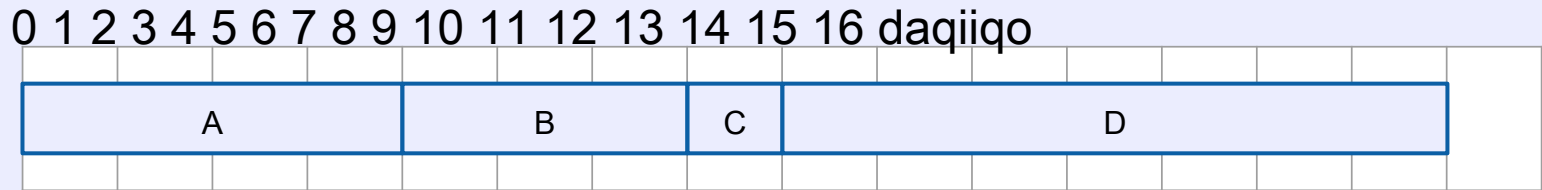
Tani waa tusaale jaantus noocaas ah:

Hawlaha waxaa lagu muujiyaa sanduuqyo (boxes).

Dhererka sanduuqa wuxuu muujinayaa inta ay qaadanayso in la dhammeeyo hawsha.



Tani waa tusaale shaxdaas oo kale:



Waxay qaadataa 4 daqiiqo in la dhammeeyo hawsha A.

Intee ayay qaadataa in la dhammeeyo hawsha D?

Waa kuwee labada hawshood ee qaata waqti isku mid ah?

Jawaabaha:

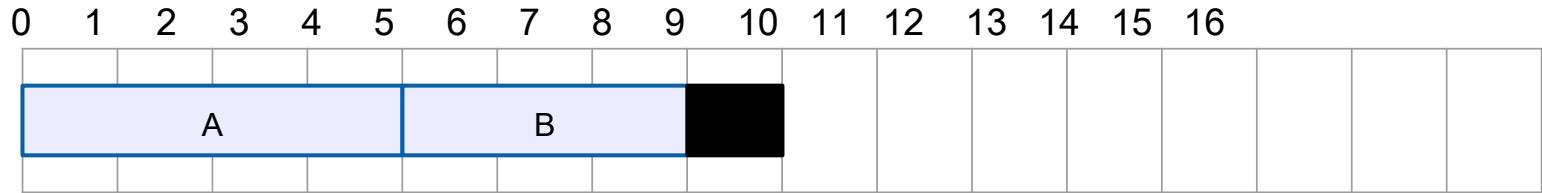
E

7 daqiiqo

C iyo E

Mararka qaarkood waxaa jiri doona meelo bannaan oo u dhexeeya sanduugyada:

Tani waa sababta oo ah, in kastoo hal hawshood la dhammeeyay, kan xiga weli ma bilaabi karo.



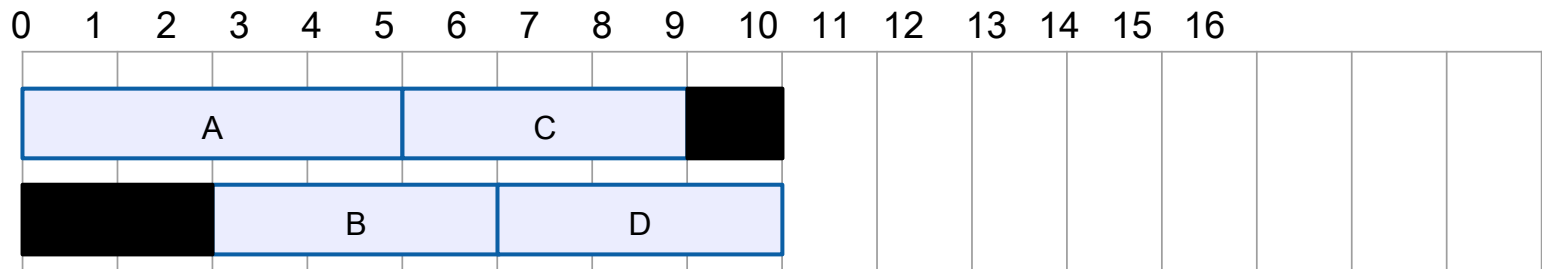
Jawaabaha:

C

D

E

Sidaa darteed shaxdani waxay muujinaysaa hawshaha ay qaban doonaan laba qof oo kala duwan.



E

F

E

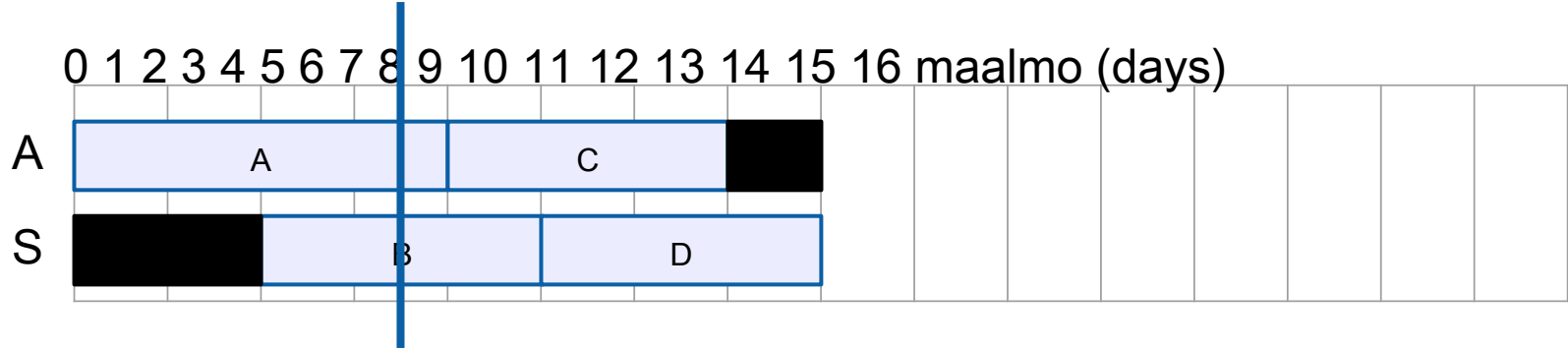
██████████

G

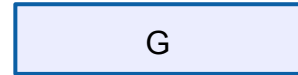
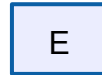
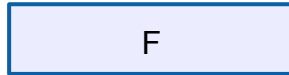
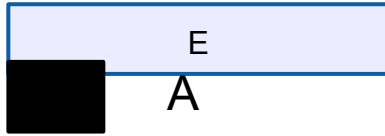
Qorsheynta mashruuc

Halkan waxaa ah mashruuc ay ka shaqaynayaan Caasha iyo Suad:

Maalinta 4aad, Caasha waxay ka shaqaynaysaa hawsha .



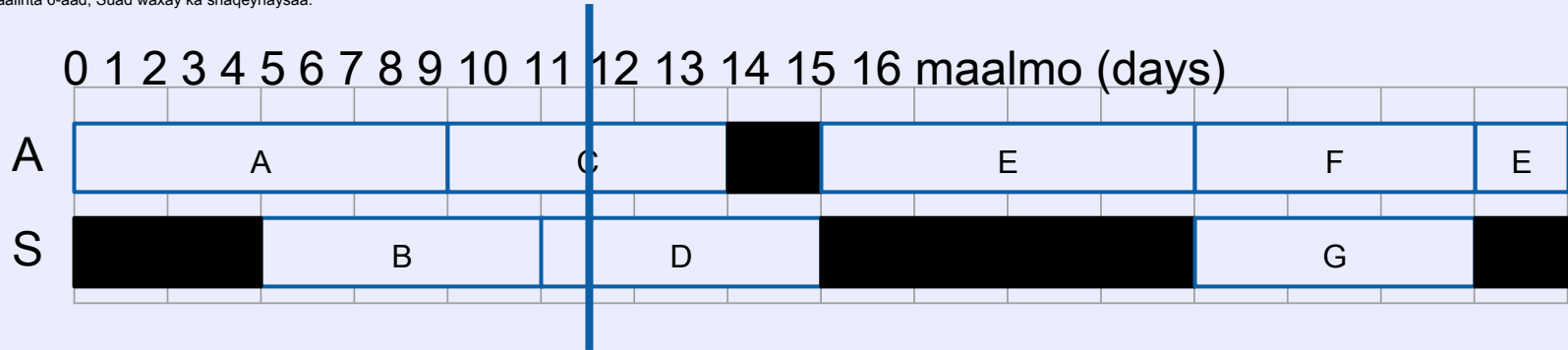
Jawaabaha:



Qorshaynta mashruuc (Planning a project)

Waa kan mashruuc ay Caasha iyo Suad ka shaqeynayaan:

Maalinta 6-aad, Suad waxay ka shaqeynaysaa:



Hawl C (Activity
C)



Hawl D (Activity
D)

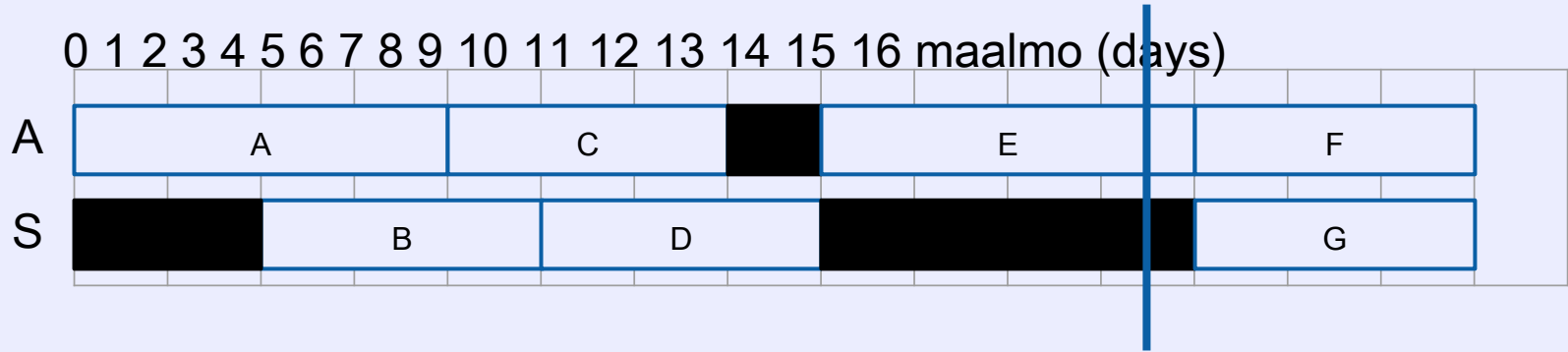


Wax hawlo ah
(No activity)



Qorshaynta mashruuc (Planning a project)

Waa kan mashruuc ay Caasha iyo Suad ka shaqeynayaan:



Sharax waxa arday kasta uu sameynayo maalinta 12-aad.

Maalintii 12-aad, Caasha waxay qabanaysaa hawsha E, Suadna ma qabanayso hawshii mashruuca.

Jawaabaha:

E	
---	--

1) Isra iyo Layla waxay ka shaqaynayaa mashruuc dugsi. Waxay u kala qaybiyeen mashruuca hawlo taxane ah. Waxay sameeyeen jaantus (table) oo ku qoran hawlahooda, inta ay qaadanayso hawsho kasta, iyo hawlo ay tahay in la dhameeyo ka hor inta aan hawsha kale la bilabn.

Waxay haystaan 2.5 saacadood oo ay ku shaqeeyaan mashruucooda.

Samee jaantus (chart) oo muujinaya cidda ka shaqaynaysa hawlo iyo goorta.

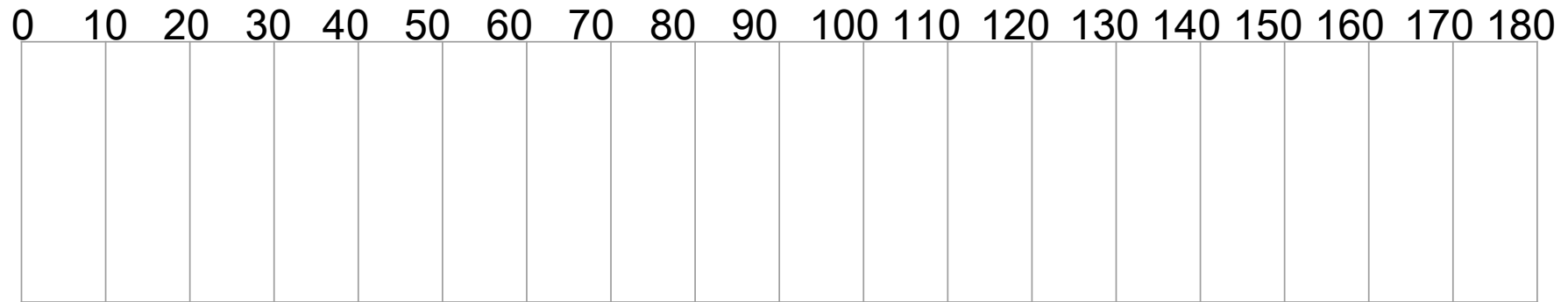
Ma Isra iyo Layla waxay dhammayn karaan mashruucooda waqtiga ku habboon?

(Jaantus (template) ayaa la bixiyay.)

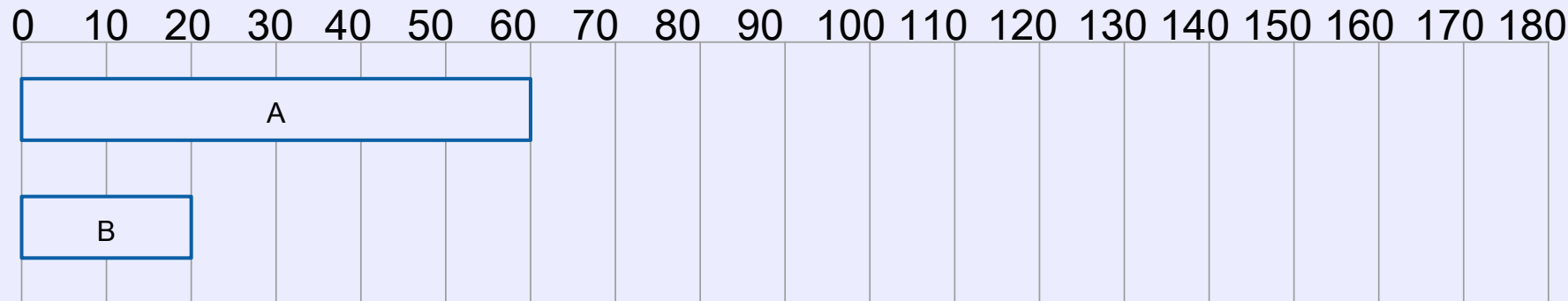
1)

Hawsha	Muddada	Hawlaha ay tahay in marka hore la dhameeyo
A (cilmi-baaris)	60 daqiiqo	Waxba
B (soo ururin qalabka)	20 daqiiqo	Waxba
C (samee templates)	25 daqiiqo	B
D (samee artwork)	60 daqiiqo	A, C
E (qoris)	50 daqiiqo	A, C
F (hubin)	30 daqiiqo	D, E
G (ururin)	15 daqiiqo	D, E

1) Qaabka jaantuska

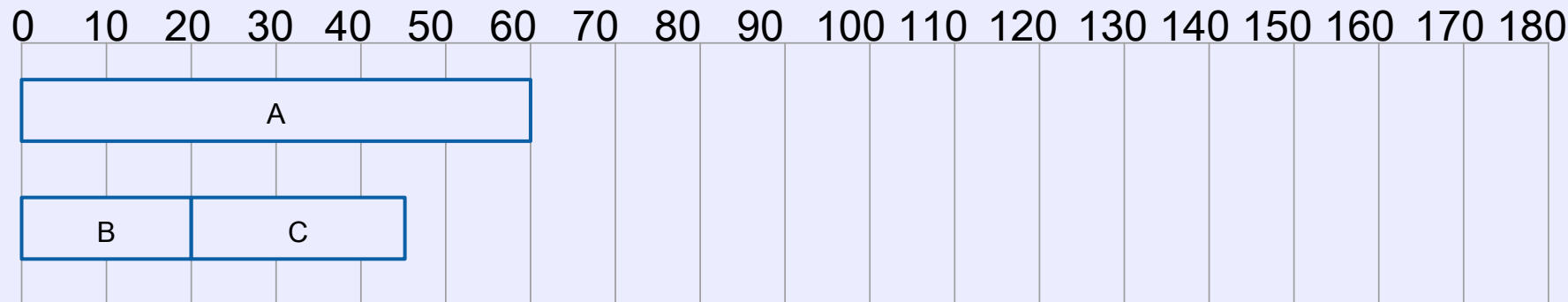


1) Tusaalahani wuxuu muujinayaa Isra iyo Layla oo dhameystiraya mashruuca waqtigii.



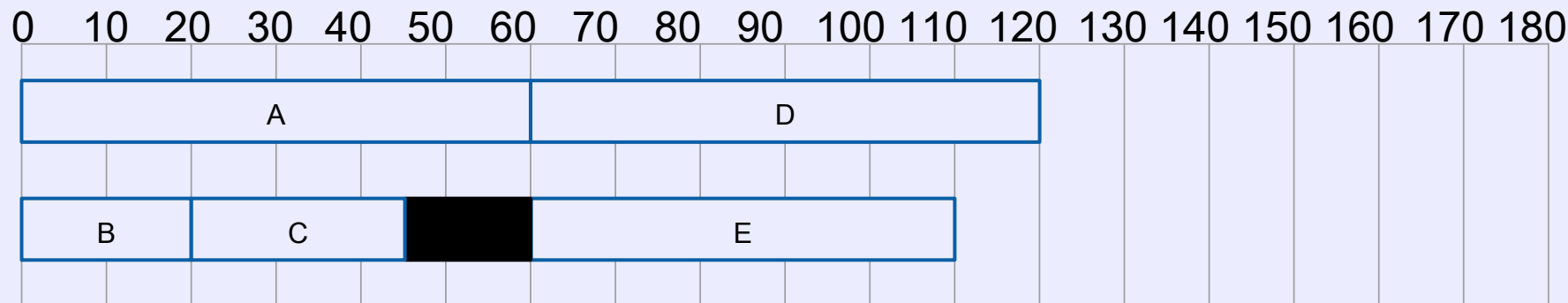
Hawl	Muddad a	Hawlaha ay tahay in marka hore la dhameeyo
A (cilmi-baaris)	60 daqiiqo	Midna
B (soo ururin qalabka)	20 daqiiqo	Midna

1) Tusaalahani wuxuu muujinayaa Isra iyo Layla oo dhameystiraya mashruuca waqtigii.



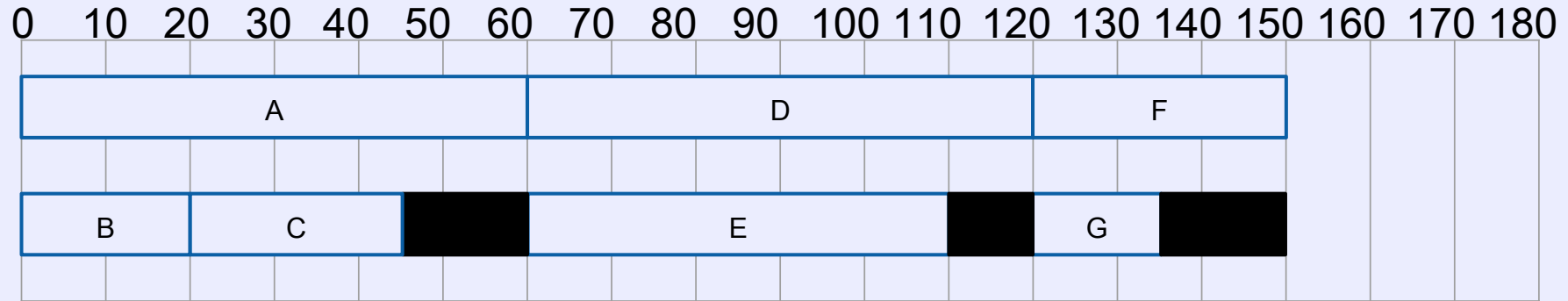
Hawl (Activity)	Muddad a (Duration)	Hawlaha ay tahay in marka hore la dhameeyo
C (samee templates)	25 daqiiqo	B

1) Tusaalahan wuxuu muujinayaa Isra iyo Layla oo dhameystiraya mashruuca waqtigii.



Hawl (Activity)	Muddad a (Duration)	Hawlaha ay tahay in marka hore la dhameeyo
D (samee artwork)	60 daqiiqo	A, C
E (qoraal)	50 daqiiqo	A, C

1) Tusaalahan wuxuu muujinayaa Isra iyo Layla oo dhameystiraya mashruuca waqtigii.



Hawl (Activity)	Muddad a (Duration)	Hawlaha ay tahay in marka hore la dhameeyo
F (hubinta)	30 daqiiqo	D, E
G (ururinta)	15 daqiiqo	D, E

Logistics-ku waa abaabulka taxaddar leh ee mashruuc adag (hawlo kala duwan) si uu ugu dhaco qaab guul leh oo waxtar leh.

Milan (Solution) ayaa laga yaabaa inay u ekaato mid ku habboon (optimal), laakiin dhab ahaantii, aanay ahayn mid la taaban karo (practical).