Critical path analysis

AS Decision Mathematics 1 | Edexcel 8FM0 | 12 questions, 77 marks

Further Maths topic practice

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Name: _____ **Date:** _____ **Score:** _____ **/ 77**

1 The activity network below shows the activities, A to H, needed to complete a project. Each activity is represented by an arc and its duration, in days, is shown in brackets. The events are numbered 1 to 6.

a. Calculate the early event time and the late event time for each event.

b. State the minimum completion time of the project.

c. State the critical activities.

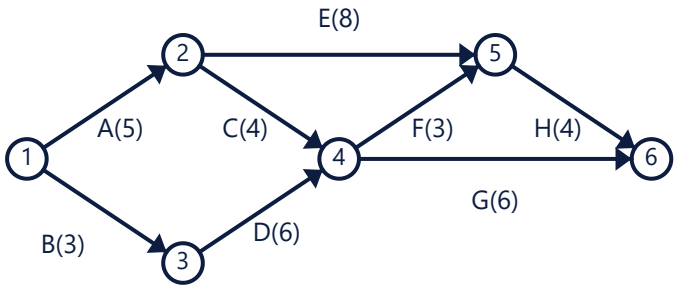


Diagram NOT accurately drawn

(5 marks)

Answer _____

Free for classroom and home use: print, photocopy and share. Not for resale or re-hosting.

2 The precedence table shows the activities needed to refurbish a classroom.

Activity	Immediately preceding activities
A	–
B	–
C	A
D	A
E	B, C
F	D
G	E, F

Draw the activity network, using activity on arc. Number the events.

Draw your activity network in this space

Diagram NOT accurately drawn

(4 marks)

Answer _____

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3 The activity network below represents a project to build a garden office in Cheshire. The duration of each activity is given in days.

a. Find the early and late event times.

b. State the critical path and the minimum completion time.

c. Find the total float of each non-critical activity.

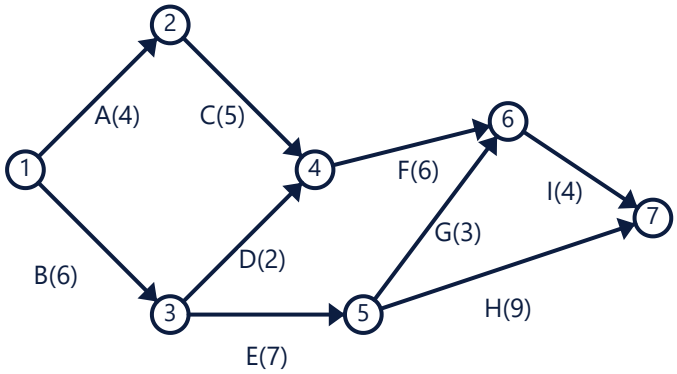


Diagram NOT accurately drawn

(6 marks)

Answer

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4 The precedence table shows the activities in a project to launch a new school website.

Activity	Immediately preceding activities
A	–
B	–
C	A
D	A, B
E	C
F	D
G	E, F

a. Draw the activity network, using activity on arc and the minimum number of dummies.

b. Explain why a dummy is needed.

Draw your activity network in this space

Diagram NOT accurately drawn

(5 marks)

Answer

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5 The activity network below represents a project. The dashed arcs are dummies.

a. Write down the immediately preceding activities for each of the activities A to H.

b. Explain why the dummy from event 5 to event 6 is needed.

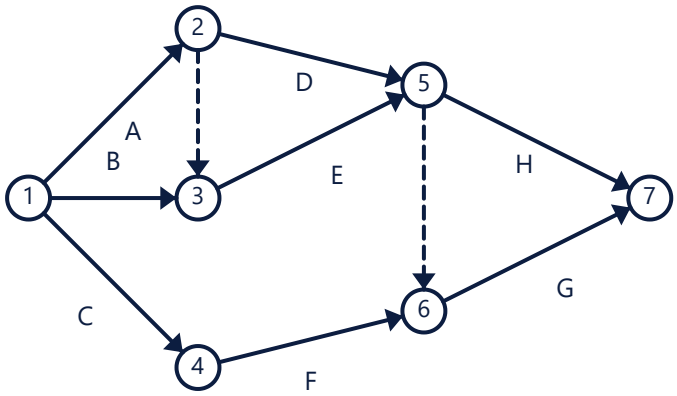


Diagram NOT accurately drawn

(4 marks)

Answer _____

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6 The activity network below represents the activities needed to stage a sixth-form drama production in Exeter. Each duration is in days and the dashed arc is a dummy.

a. Find the early and late event times.

b. State the critical activities and the minimum completion time.

c. Find the total float of each non-critical activity.

d. Explain what the total float of an activity means in this context.

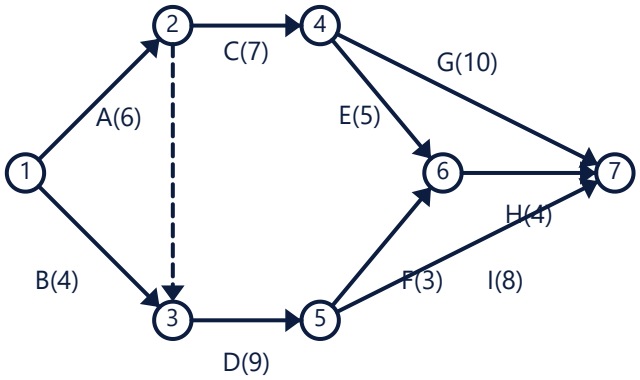


Diagram NOT accurately drawn

(7 marks)

Answer

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7 The activity network below shows the tasks, with durations in hours, involved in setting up a village fete in Rutland. Each task needs one worker.

a. Find the minimum completion time for the project.

b. Calculate a lower bound for the number of workers needed to complete the project in the minimum time. You must show your working.

c. Explain why the project may need more workers than your lower bound.

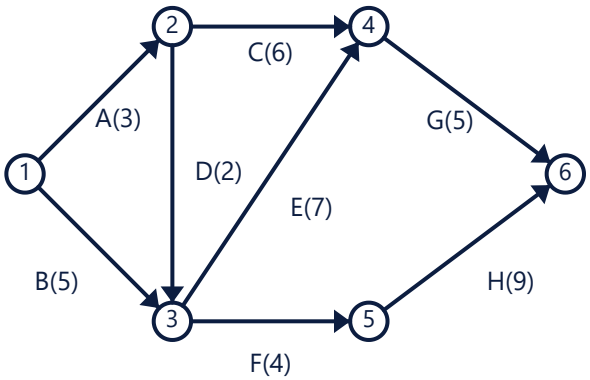


Diagram NOT accurately drawn

(6 marks)

Answer _____

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8 The activity network below represents a kitchen refit in Nottingham. Durations are in days.

a. Find the early and late event times and state the critical path.

b. Find the total float of each non-critical activity.

c. On the grid below, draw a Gantt (cascade) chart for the project, showing the critical activities on the top rows and each float as a dashed box.

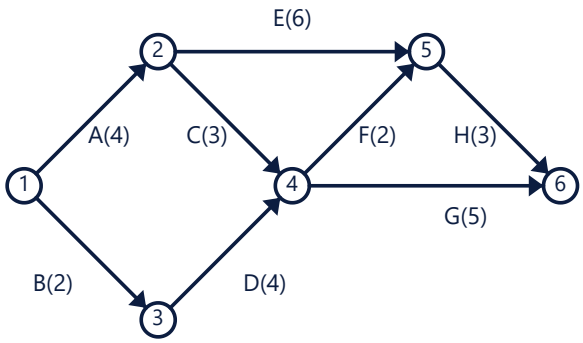
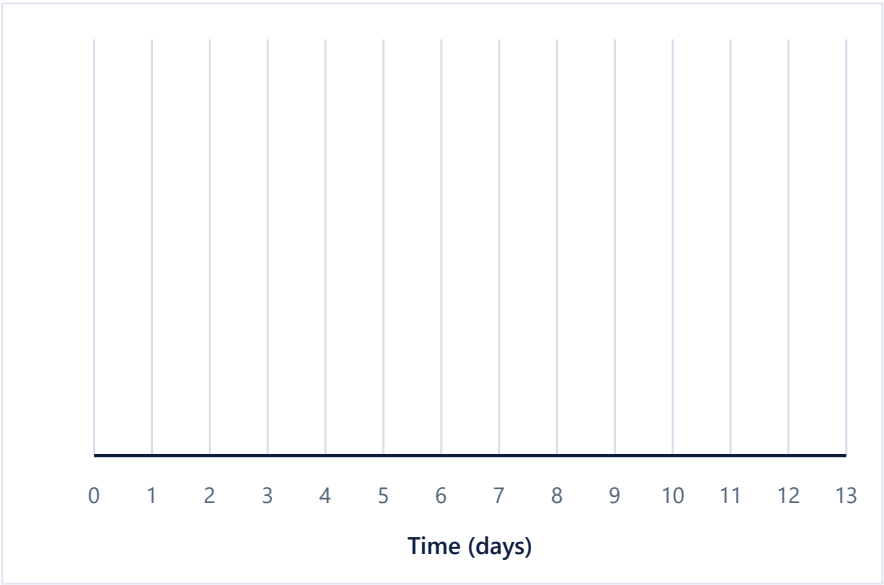


Diagram NOT accurately drawn

Activity network



Grid for the Gantt chart

(7 marks)

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Answer

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9 The table shows the activities, with durations in weeks, for a project to convert a barn in Shropshire into holiday cottages.

Activity	Immediately preceding activities	Duration (weeks)
A	–	5
B	–	3
C	A	4
D	A, B	6
E	B	9
F	C	7
G	D, E	2

a. Draw the activity network, using activity on arc and the minimum number of dummies.

b. Explain why two dummies are needed.

c. Find the minimum completion time and state the critical activities.

Draw your activity network in this space

Diagram NOT accurately drawn

(8 marks)

Answer

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10 The activity network below represents a project to renovate a café in Brighton. The durations are in days, and activity F takes x days.

a. Find, in terms of x where necessary, the early event times.

b. Find the range of values of x for which activity F is critical.

c. Given that $x = 2$, find the minimum completion time and the total float of F.

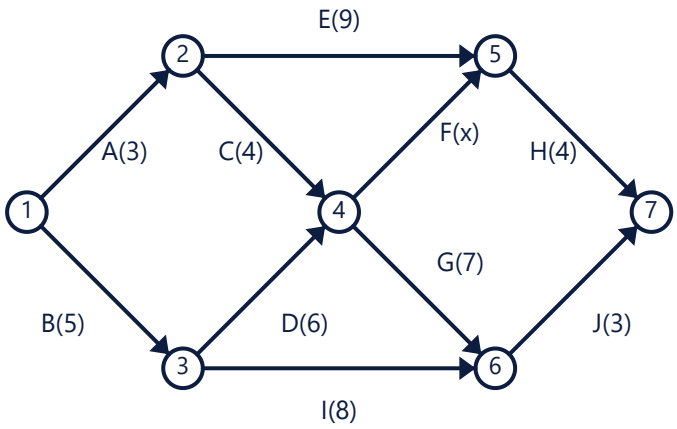


Diagram NOT accurately drawn

(7 marks)

Answer _____

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11 The activity network below shows a project to install solar panels on a primary school in Leicester. Durations are in days.

a. Find the early and late event times and the minimum completion time.

b. Find the total floats of activities B, G and I.

Explain the effect on the completion time of the project of each of the following separate delays:

c. activity I takes 5 days longer than planned,

d. activity G takes 3 days longer than planned,

e. activity B takes 2 days longer than planned.

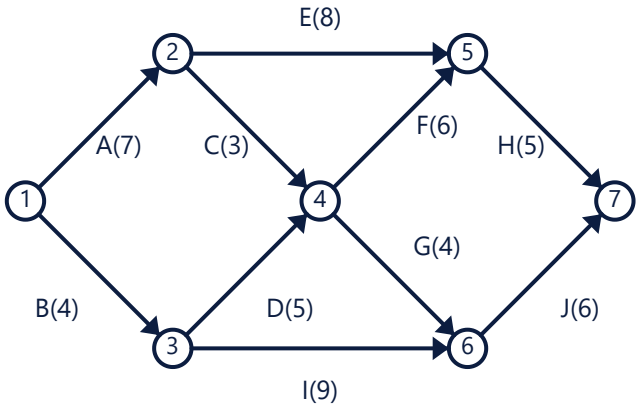


Diagram NOT accurately drawn

(8 marks)

Answer

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12 The table shows the activities, with durations in days, needed to set up a new community library in Sheffield.

Activity	Immediately preceding activities	Duration (days)
A	–	4
B	–	6
C	–	3
D	A	5
E	A, B	4
F	C	7
G	D	6
H	D, E	3
I	F	5
J	G, H, I	2

a. Draw the activity network, using activity on arc and the minimum number of dummies.

b. Find the early and late event times and state the critical activities.

c. Find the total float of each non-critical activity.

d. Each activity needs one worker. Calculate a lower bound for the number of workers needed to finish the project in the minimum time.

Draw your activity network in this space

Diagram NOT accurately drawn

(10 marks)

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Answer

End of questions | Total 77 marks

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