

# Exercise walk-through

Operations strategy ■ 9.3

eXercise

## You must be able to

- explain lean production and capacity management
- calculate **total float** and identify the critical path
- analyse and evaluate the usefulness of CPA

## Method — Critical path analysis

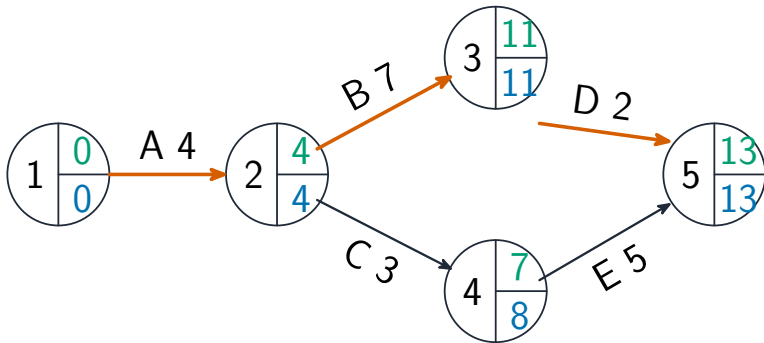
$$\text{total float} = \text{LFT} - \text{duration} - \text{EST}$$

- **Worked:** LFT 12, duration 4, EST 5  $\rightarrow$  total float =  $12 - 4 - 5 = 3$  days.
- **Critical path:** the chain of activities with **zero** float — they cannot be late or the project is late.
- **Lean production:** make products with the least waste (just-in-time, continuous improvement).

**Answer shapes:** AO1 + AO2 + AO3 (reasoning chain) + AO4 (a supported judgement *in context*).

## Method — Critical path analysis

top = earliest start time      critical path (zero float)  
bottom = latest finish time



## Practice 2.1 ■ 2 marks

Define the term *lean production*.

## Solution 2.1

Method: Critical path analysis

### Worked steps

producing goods with the least possible waste of time, materials, space and effort (2 for a clear definition; 1 for a partial idea).

## Practice 2.2 ■ 2 marks

An activity has an LFT of 14, a duration of 6 and an EST of 5. Calculate its total float.

## Solution 2.2

Method: Critical path analysis

### Worked steps

total float =  $14 - 6 - 5 = 3$  (2; award 1 for a correct method with the wrong figure).

## Practice 2.3 ■ 2 marks

Define the term *critical path*.

## Solution 2.3

Method: Critical path analysis

### Worked steps

the chain of activities with zero float, which sets the minimum time the project can take (2 for a clear definition; 1 for a partial idea).

## Exam-style 3.1 ■ 3 marks

Explain one benefit to a business of using **lean production**.

## Solution 3.1

Method: Critical path analysis

### Worked steps

[3] **AO1** 1 — name a benefit (lower costs; less waste; less money tied up in stock; higher quality). **AO2** up to 2 — develop it, e.g. less waste of materials → lower cost per unit → higher profit or lower prices (2 developed / 1 limited).

## Exam-style 3.2 ■ 8 marks

Analyse two benefits to a business of using **critical path analysis** to plan a project.

## Solution 3.2

Method: Critical path analysis

### Worked steps

[8] For **each** of two benefits: **AO1** 1 + **AO2** 1 + **AO3** up to 2. Example chains — *find critical tasks*: CPA shows which tasks have zero float → managers focus resources on them → the project is less likely to be late. *Order resources on time*: knowing each task's earliest start → materials and labour arrive just when needed → lower holding cost and no idle time. Maximum 4 per benefit, 8 total.

## Exam-style 3.3 ■ 12 marks

Evaluate the usefulness of critical path analysis to a business managing a complex project.

## Solution 3.3

Method: Critical path analysis

### Worked steps

[12] **AO1** 2 / **AO2** 2 / **AO3** 2 / **AO4** up to 6. **Useful:** shows the shortest project time, the critical tasks and where spare time (float) exists, helping plan resources and spot delays. **Limited:** it is only as good as the time estimates, cannot show quality or cost, and a complex network is hard to manage if conditions change. **Judgement:** CPA is valuable for planning a large project's time and resources, but it must use realistic estimates and be combined with cost and quality judgement — its usefulness depends on the accuracy of the data.