10.3 Inventory

Name: _____ Class: _____ Date: _____ **Total: 15 marks**

KEY WORDS economic order quantity • reorder point

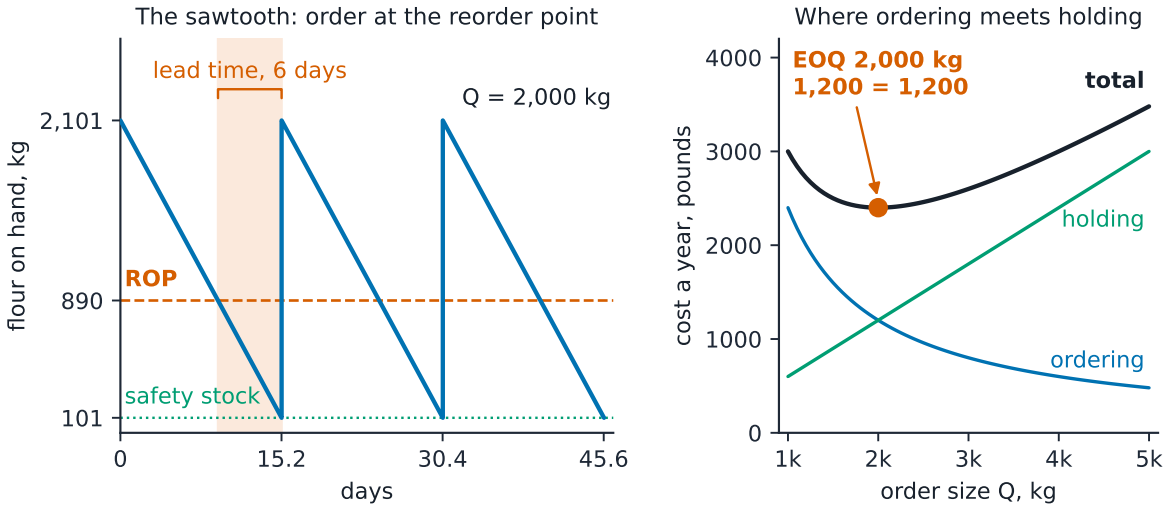
Objective

Compute the EOQ and its costs, set a reorder point with a service level, and check a quantity discount honestly.

1 Key knowledge and worked examples

■ EOQ and ROP

$EOQ = \sqrt{2DS/H}$; at the EOQ, ordering = holding. $ROP = d \times LT + z\sigma_d\sqrt{LT}$. A discount is checked on total cost: purchase + ordering + holding.



Order at the reorder point, not when the bin looks empty

■ Worked example. Flour

$\sqrt{2 \times 48{,}000 \times 50/1.20} = 2{,}000$ kg ✓; ROP $789 + 101 = 890$ ✓; the 2% discount at 4,000 kg saves 1,320 ✓.

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2 Practice

2.1 Sugar: 30,000 kg a year, 60 an order, 1.60 a kg a year to hold. The EOQ and the orders a year. [4]

2.2 Annual ordering and holding cost at the EOQ. [2]

2.3 Lead time 5 days, daily demand sd 12 kg, service level 97.5% ($z = 1.96$). Lead-time demand, safety stock and the reorder point (nearest kg). [5]

2.4 The supplier offers 3% off the 0.80 a kg price for orders of 3,000 kg. Total cost at the EOQ and at 3,000 kg; decision. [4]

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Solutions

2.1

- $\sqrt{2 \times 30{,}000 \times 60/1.60} = \sqrt{2{,}250{,}000} = 1{,}500$ kg.
- $30{,}000/1{,}500 = 20$ orders a year.

2.2

- Ordering $20 \times 60 = 1{,}200$; holding $750 \times 1.60 = 1{,}200$ - equal, as the EOQ requires.

2.3

- Daily $30{,}000/365 = 82.2$ kg; lead-time demand $82.2 \times 5 = 411$ kg.
- $\sigma_{LT} = 12\sqrt{5} = 26.8$; safety stock $1.96 \times 26.8 = 53$ kg.
- $ROP = 411 + 53 = 464$ kg.

2.4

- EOQ: purchase $24{,}000 + 1{,}200 + 1{,}200 = 26{,}400$.
- 3,000 kg: purchase $23{,}280$ + ordering $10 \times 60 = 600$ + holding $1{,}500 \times 1.60 = 2{,}400$ $= 26{,}280$.
- Saves 120 a year - take it, but only just; a 2.5% discount would break even.

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