Solutions

Marking: **K** knowledge, **App** use of the case or data, **An** analysis (a chain of reasons: cause, then effect), **Ev** evaluation (a judgement with a reason). In calculations, **M1** is for the method and **A1** for the answer; **B1** is an independent mark.

Each answer shows the steps, then the **result**.

2.1

$$\sqrt{\frac{2 \times 12{,}000 \times 40}{0.96}}$$

$= \mathbf{1{,}000}$ kg

2.2

12 orders a year

ordering $12 \times 40 = £480$; holding $500 \times 0.96 = £480$

2.3

lead-time demand $40 \times 5 = 200$ kg

reorder point **260** kg

use above 40 kg a day, or a late delivery, during the lead time

2.4

$1.645 \times 10 \times \sqrt{4}$

$\approx$ **33** kg

3.1

(a) $\sqrt{\dfrac{2 \times 7{,}300 \times 50}{0.73}} = \mathbf{1{,}000}$ kg

(b) $\dfrac{1{,}000}{20} = \mathbf{50}$ days

(c) lead-time demand 140 kg; safety stock $1.645 \times 5\sqrt{7} \approx 22$ kg; reorder at **162** kg

(d) stock keeps being used during the 7-day lead time, so the order must go out early enough to arrive before the bin is empty

3.2

(a) $7{,}300 + 365 + 365 = £\mathbf{8{,}030}$

(b) $7{,}154 + 182.50 + 730 = £\mathbf{8{,}066.50}$

(c) no: it costs £36.50 a year more; the saving on the price is smaller than the extra holding cost

3.3

(a) use in the lead time $35 \times 7 = 245$ kg; shortage $245 - 162 = \mathbf{83}$ kg

(b) **5–6**: safety stock is sized for random noise, not for a known event (K); raising safety stock all year would hold extra sugar for 51 weeks to cover one (App); a planned extra order before the festival costs one order (£50) and a few weeks of holding (An); but if the festival is cancelled the extra sugar must be used up, which is easy for a long-life product like sugar (An); judgement, e.g. place one extra order of about 100 kg two weeks before the festival, and keep normal safety stock (Ev). **3–4**: one side analysed, or no judgement. **1–2**: relevant points.

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