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

wash 6, cut 8

cook 9, plate 7.5 batches an hour

bottleneck: wash, so the line makes **6** an hour

2.2

wash $\dfrac{4.5}{6} = \mathbf{75}\%$

cook $\dfrac{4.5}{9} = \mathbf{50}\%$

2.3

$WIP = TH \times FT = 4 \times 1.5$

$= \mathbf{6}$ orders

2.4

cycle time $\dfrac{60}{6} = \mathbf{10}$ minutes between finished batches

flow time $10 + 15 + 20 + 8 = \mathbf{53}$ minutes for one batch to pass through

3.1

(a) prep 6.67, assemble 8; chill 8, wrap 10

(b) prep is the bottleneck: $6.67 \times 20 \approx \mathbf{133}$ an hour

(c) wrap is not the bottleneck: prep still limits the line

(d) prep rises to 13.3; the bottleneck moves to assemble and chill at 8; gain $8 - 6.67 = \mathbf{1.33}$ batches an hour

3.2

(a) $(8 - 6.67) \times 6 = \mathbf{8}$ batches

(b) $\dfrac{8}{6.67} = \mathbf{1.2}$ hours

(c) sandwiches are less fresh, so quality or shelf life falls; they need chilled storage space and staff time on Friday

3.3

7–8: overtime costs about £3,120 a year, so the bench pays back in about 3 years (App); the bench lifts output only to 8 an hour, as assemble and chill then limit the line (An); with 10% growth demand reaches 8.8, which neither option fully meets without more change (An); stock built ahead loses freshness, which matters for sandwiches (K); recommendation with a condition, e.g. keep Friday building this year and plan the bench with a second assemble slot when demand passes 8 an hour (Ev). **4–6**: sound analysis with limited use of the data or a weak judgement. **1–3**: relevant points, mostly descriptive.

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