1. Proof takes 24 minutes a batch in three slots. Capacity in batches an hour?

   _____ batches/hr

2. Centre 80, sd 2, samples of 5. The upper control limit for sample means (two decimals)?

   _____ g

3. D = 48,000 kg, S = 50, H = 1.20. The EOQ in kg?

   _____ kg

4. Naive errors 40, -20, 60, 20, 40, -20, 60. The MAD (one decimal)?

   _____ buns

5. Two depots, each weekly sd 300 and independent, z = 1.645. Pooled safety stock, to the nearest unit?

   _____ units

6. Which crash first, and why?

   ☐ H - it is last

   ☐ G - it has only one day of float

   ☐ C - critical, and 400 a day is below the 700 a day it saves

   ☐ E - it is the cheapest to shorten

7. A renewable tariff at 0.06 kg/kWh does what to the footprint?

   ☐ the whole 3,000 kg halves too

   ☐ nothing - tariffs are paperwork

   ☐ electricity 1,824 to 576; the site halves to 1,244; the flour is unchanged

   ☐ flour emissions fall too

8. After a second mixer (mix 10.00), where is the bottleneck?

   ☐ mix at 10.00

   ☐ proof at 7.50

   ☐ pack at 10.00

   ☐ bake at 6.67 an hour

9. Sample 6 reads 82.9 against an upper limit of 82.68. The right response?

   ☐ widen the limits to 83

   ☐ find the nameable cause - the flour lot changed

   ☐ retune the mixer by minus 0.5 g

10. At the EOQ, how do annual ordering and holding costs compare?

    ☐ equal - 1,200 each

    ☐ holding is double ordering

    ☐ it depends on the price of flour

    ☐ ordering is double holding

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1. **7.5 batches/hr**

   $60 \times 3/24 = 7.5$.

2. **82.68 g**

   $80 + 3 \times 2/\sqrt{5} = 82.68$.

3. **2000 kg**

   $\sqrt{2 \times 48{,}000 \times 50/1.2} = \sqrt{4{,}000{,}000} = 2{,}000$.

4. **37.1 buns**

   $260/7 = 37.1$.

5. **698 units**

   $1.645 \times \sqrt{300^2 + 300^2} = 1.645 \times 424.3 = 698$.

6. **C - critical, and 400 a day is below the 700 a day it saves**

   Only critical days shorten the project; C is on the path and cheapest per day.

7. **electricity 1,824 to 576; the site halves to 1,244; the flour is unchanged**

   Scope 2 moves with the tariff - 2,492 to 1,244, a 50% fall on site but only 42% cradle-to-gate; scope 3 needs the chain.

8. **bake at 6.67 an hour**

   The constraint moves to the next-slowest station - bake at 6.67.

9. **find the nameable cause - the flour lot changed**

   Beyond the limits is a special cause; find it rather than nudge the process.

10. **equal - 1,200 each**

    The EOQ is defined by the balance: D/Q x S = Q/2 x H.

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