Activity: exploding the blade assembly

Chapter 6, Material and Distribution Requirements Planning

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Groups of three. 20 minutes.

Names: _____

The structure. A mower blade assembly, from the same turf-equipment line as the chapter's mower deck.

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Blade assembly (BA), lead time 1
    Blade (BL)          1 each, lead time 2
    Adapter (AD)        2 each, lead time 1
        Bolt (BT)       1 each, lead time 2
    Bolt (BT)           2 each, lead time 2
```

The master schedule for BA: 30 in period 5, 50 in period 7, 40 in period 8.

On hand at the start of period 1: adapters 10, bolts 50, nothing else. Nothing is on order anywhere. Every item orders **lot-for-lot**, with no safety stock.

Conventions, as in the activity on the spindle housing's record. Projected on hand is an end-of-period figure. A net requirement is never negative. A release sits in the period its receipt is due, less the lead time. A release that would fall before period 1 is *past due*: write its receipt in the planned order receipts row, leave the release out of the release row, and report it below the record.

The explosion equation. Let G_{jt} be item j's gross requirement in period t, q_{ij} the quantity per (the number of units of j in one unit of its parent i), and Rel_{it} parent i's planned order release in period t. The sum runs over every parent of j:

$$G_{jt} = \sum_{i \in \text{parents}(j)} q_{ij}\, Rel_{it}$$

Part A. Before any record

1. Draw the product structure as a tree, with quantities per on the arcs.
2. Give every item its low-level code, and the order the items must be planned in.
3. What is the cumulative lead time? Is a horizon with four empty periods in front of the first scheduled requirement long enough?

Part B. The blade assembly

BA, lead time 1		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Gross requirements		0	0	0	0	30	0	50	40
Projected on hand	0								
Net requirements									
Planned order receipts									
Planned order releases									

Part C. The two level-1 items

BL, lead time 2		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Gross requirements									
Projected on hand	0								
Net requirements									
Planned order receipts									
Planned order releases									

AD, lead time 1		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Gross requirements									
Projected on hand	10								
Net requirements									
Planned order receipts									
Planned order releases									

Part D. The bolt, which has two parents

Keep the two contributions apart before you add them.

BT, lead time 2		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
From BA (2 each)									
From AD (1 each)									
Gross requirements									
Projected on hand	50								
Net requirements									
Planned order receipts									
Planned order releases									

Does the bolt's gross requirement row look like the master schedule? Why not?

Part E. The schedule moves

Sales pulls the 30 blade assemblies forward from period 5 to **period 4**, and all 50 bolts on hand turn out to be **allocated** to a service order (reduce the opening balance, as the chapter does). Replan what changes. Is anything past due? Which item, how many, and in which period?

Part F, if you have time. The wrong order

Suppose someone plans the bolt right after the blade assembly, *before* the adapter, using only BA's contribution and the 50 bolts on hand. What receipt does that plan schedule for period 4, and in which period is it released? Then the adapter is planned and asks for its bolts. What goes wrong, and why?

Exit ticket (tear off and hand in)

Name: _____

1. A component's gross requirements are its parents' _____ times the quantity per.
2. In one sentence: why is the lot-sizing rule that is cheapest at the end item not the cheapest for the whole product?