# Cupcake Constellation

## HOST ONLY - preparation and story

**Includes answers. Keep these pages and all hint pages with the adult host.**

Welcome to the cupcake constellation control. The display lights are controlled by pulses that may move more than one dial. Your team has the original records on the table. First recover five pieces of information, then use the final plan to configure the constellation display. Keep every result beside its badge so another teammate can check your reasoning.

1. Print the six player sheets and two record sheets for each team. Keep answers and hints with the host.

2. Lay out Unlabelled legend, Supply cards, the remaining clue sheets and the final plan. All task records are printed inside the sheets; no extra prop is needed.

3. After each clue, pass roles one seat clockwise. With two players, combine Reader with Recorder and Checker with Builder. With five or six, add a second checker and a source finder; everyone explains one decision.

4 players; 1 team. Give each team 6 player sheets and 2 record sheets. Share one host guide and one set of three hint levels.

Paper and pencils are enough. Keep whole sheets at one table; nothing needs cutting, folding or hiding.

Optional: 4 invitations or certificates, only if selected.

# Cupcake Constellation

## HOST ONLY - solution guide

### 1. Signal: REST-OPEN

A consistent one-to-one mapping satisfies every training example. Use the complete mapping to read the two-signal message in order. Result: REST-OPEN.

### 2. Kit: E

Compare coverage before weight. Only complete kits qualify; minimize their combined weight and report the selected cards in alphabetical order. Result: E.

### 3. Stock: 9

Known stock: 8 + 2 - 3 = 7. Closing stock 16 minus 7 gives the missing return 9. Cancelled +7 never arrived. Result: 9.

### 4. Orbit: 3

A3, B1, C2, D3 reads STAR. The conversion table gives 3. Result: 3.

### 5. Tray: 6

Remove 1 from 25; share 24 among 4 parcels to get 6. Check 2 x 6 + 3 = 15. Result: 6.

### 6. Final: A0-B2-C1-D0-E0

Select one pulse card for each of the five badge results. Add the turns by dial column to the printed starting states and wrap each total around 0, 1, 2. The checked configuration is A0-B2-C1-D0-E0; each pulse pair has equal size and total turns, so its shape does not identify the correct choice.

# Cupcake Constellation

## HOST ONLY - timeline, story and ending

3 minutes: Read the opening. Show the evidence record and choose starting roles.

5 minutes: Solve Signal. Offer one hint at a time and rotate roles after checking.

5 minutes: Solve Kit. Offer one hint at a time and rotate roles after checking.

5 minutes: Solve Stock. Offer one hint at a time and rotate roles after checking.

5 minutes: Solve Orbit. Offer one hint at a time and rotate roles after checking.

5 minutes: Solve Tray. Offer one hint at a time and rotate roles after checking.

7 minutes: Build the checked five-dial configuration using all five results.

3 minutes: Read the ending. Ask each teammate to explain one rejected alternative.

After Kit: Several recovered pulses may affect the same dial. Keep the legend and the starting positions visible. Pass the record sheet to a new checker before opening the next clue.

After Orbit: Four results are recorded. Each teammate points to a source supporting one result. Complete the fifth check before building the checked five-dial configuration.

Check every result using the solution guide. Offer the next hint only when requested; save the answer reveal until the group is ready.

**The panel is ready at A0-B2-C1-D0-E0; every recorded pulse has been applied. Thank each teammate for a different piece of reasoning.**

Explain one tempting wrong choice and the evidence that ruled it out. Show how each of the five results affected the checked five-dial configuration. If a clue is missing, say what remains uncertain before reopening that sheet.

Duration and ages are estimates. Adjust the pace and offer help for your group.

# Cupcake Constellation

## Player clue 1: Signal | Team 1

The display lights are controlled by pulses that may move more than one dial. We will use the records on the table to configure the constellation display. Share the reading, explain each choice and keep the five results for the final plan.

Each signal means one different word. Use the training examples to recover the legend. Words marked "any order" may be swapped; compare shared signals across cards. Decode the received message from left to right.

**Unlabelled legend**

Signals: DOT, BAR, ARC. Words: OPEN, CHECK, REST.

Each signal has one word; each word is used once.

**Training messages**

DOT+BAR means OPEN+REST (any order)

BAR+ARC means OPEN+CHECK (any order)

DOT+ARC means REST+CHECK (any order)

**Received message**

DOT > BAR

Report decoded words in order, with hyphens.

Signal result: _____

# Cupcake Constellation

## Player clue 2: Kit | Team 1

Pack a kit that supplies all three needs. One card may cover two needs, but its weight is counted once. Choose the lightest complete kit within the carrier limit. Report its card letters alphabetically.

**Supply cards**

A: weight 3; gives tie+light

B: weight 2; gives mark

C: weight 2; gives tie

D: weight 4; gives light+mark

E: weight 4; gives tie+light+mark

**Packing order**

Capacity 7; must cover tie, light, mark.

Use the lightest complete kit. Each card once.

Write chosen card IDs alphabetically, with hyphens.

Kit result: _____

# Cupcake Constellation

## Player clue 3: Stock | Team 1

Stock desk: A return entry lost its amount. Use the opening and closing stock to find the missing return. Apply DONE entries; ignore the CANCELLED plan.

### Opening stock: 8. Closing stock: 16.

| |
|---|
| **Received: +2 DONE** |
| **Planned: +7 CANCELLED** |
| **Issued: -3 DONE** |
| **Returned: ? DONE** |

Missing return = ? units. Ignore cancelled plans.

Stock result: _____

# Cupcake Constellation

## Player clue 4: Orbit | Team 1

Orbit desk: Read the letter at each coordinate, in order. Letter = column; number = row. Convert the complete word using the printed table.

**Columns: A, B, C, D. Rows: 1, 2, 3.**

| | | | | |
|---|---|---|---|---|
| **1** | **W** | **T** | **C** | **F** |
| **2** | **B** | **E** | **A** | **L** |
| **3** | **S** | **K** | **N** | **R** |

**STAR = 3**

**BEAM = 6**

**DOCK = 9**

**READ COORDINATES IN ORDER:**

**A3 > B1 > C2 > D3**

Orbit result: _____

# Cupcake Constellation

## Player clue 5: Tray | Team 1

Tray desk: Every parcel has the same whole-number weight. Remove loose units, find ONE parcel and check the second rule.

**4 parcels + 1 loose units = 25 units**

**2 parcels + 3 loose units = 15 units**

One parcel = ? units. Whole numbers 1-9.

All parcels have equal weight.

Tray result: _____

# Cupcake Constellation

## Player clue 6: Final | Team 1

Use the five results to select five pulse cards. Start at the recorded dial states. Add all selected turns for each dial and follow its loop: 0, 1, 2, then 0 again. Report the final state of dials A through E.

Use your results from: Signal, Kit, Stock, Orbit, Tray.

**Control panel**

Dial order: A, B, C, D, E. States: 0 > 1 > 2 (loop).

Start: A1 / B2 / C0 / D1 / E2.

**Pulse cards (turns in dial order)**

Signal: REST-OPEN=(2,1,0,0,0); OPEN-CHECK=(1,2,0,0,0)

Kit: A-B=(0,1,0,2,0); E=(0,2,0,1,0)

Stock: 9=(0,0,1,2,0); 16=(0,0,2,1,0)

Orbit: 6=(2,0,0,1,0); 3=(1,0,0,2,0)

Tray: 6=(2,0,0,0,1); 1=(1,0,0,0,2)

**Setting rule**

Add every chosen pulse. Move around each dial loop.

Report dial ID + state, in order, with hyphens.

Final result: _____

Ask your host to check your final result and read the ending.

# Cupcake Constellation

## Hint level 1 - HOST ONLY

### 1. Signal

Look at the training cards that share one signal.

### 2. Kit

Read each supply card and the three required needs.

### 3. Stock

Find opening stock, closing stock and the DONE or CANCELLED marks.

### 4. Orbit

Find the column letters and row numbers on the grid.

### 5. Tray

Find the equal parcels and the separate loose units.

### 6. Final

Find the starting states, dial order and pulse-card key.

# Cupcake Constellation

## Hint level 2 - HOST ONLY

### 1. Signal

In an unordered pair, a word cannot be assigned by its left/right position. Use the overlap with another pair.

### 2. Kit

A light card alone may leave a need uncovered; a shared supply counts for both needs.

### 3. Stock

Only completed entries change stock. A cancelled plan cannot be added or subtracted.

### 4. Orbit

A coordinate gives column first and row second; keep the printed coordinate order.

### 5. Tray

Remove the loose units before sharing the remaining weight among equal parcels.

### 6. Final

Each selected vector lists turns for every dial. Several different cards can affect the same dial.

# Cupcake Constellation

## Hint level 3 - HOST ONLY

### 1. Signal

Give each signal a different word, check every training example and only then decode the received message in its printed order.

### 2. Kit

Compare complete combinations, adding each chosen card weight once. Reject any combination over the limit before choosing the lightest.

### 3. Stock

Apply every known completed change to opening stock. Compare that result with closing stock to recover the missing completed return.

### 4. Orbit

Read the full word before using the conversion table. If the word is missing, recheck each row and column rather than choosing a similar word.

### 5. Tray

Find one parcel from the first equation, then substitute that weight into the second equation before recording it.

### 6. Final

Add one dial column at a time to its starting state, wrap around the three-state loop, then check that all five pulse cards were used.

# Cupcake Constellation

## Team 1 result record

Write the complete result from each clue. Results can be words, routes, orders, settings or numbers.

Signal: _____

Kit: _____

Stock: _____

Orbit: _____

Tray: _____

Keep this record beside the final clue. Copy results exactly, including any leading zero.

Reader / Recorder / Evidence checker / Route or model builder

After each clue, pass roles one seat clockwise. With two players, combine Reader with Recorder and Checker with Builder. With five or six, add a second checker and a source finder; everyone explains one decision.

# Cupcake Constellation

## Team 1 final result and celebration

## Our final challenge: Final

We combined our earlier clues to decide:

_____

_____

We know it works because:

_____

_____

Host: compare the result with your solution guide. Read the ending when it matches, then let the team explain one discovery.

No physical lock or prize is required. Draw a celebration star here if you like.

# Cupcake Constellation

**You're invited to a mystery!**

## Join Birthday Explorer for Cupcake Constellation.

The display lights are controlled by pulses that may move more than one dial. Work together to configure the constellation display.

Date: _____

Time: _____

Place: _____

Bring your curiosity. Paper and pencils are provided. Share ideas and solve six clues together.

Designed for ages 8-10. Estimated 35-50 minutes.

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### Mystery Explorer

# Presented to Birthday Explorer

Team member: _____

For completing Cupcake Constellation with curiosity, teamwork and kindness.

The panel is ready at A0-B2-C1-D0-E0; every recorded pulse has been applied. Thank each teammate for a different piece of reasoning.

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Host signature: _____

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