YEAST BALLOON EXPERIMENT

NAME

CLASS / DATE

01 QUESTION

How does measured water temperature change balloon circumference over 20 minutes when yeast and sugar are matched?

02 PREDICT BEFORE YOU MEASURE

ACROSS 20 MINUTES, BALLOON CIRCUMFERENCE MAY…

○ grow fastest in warm water ○ change similarly in all conditions ○ show no clear pattern yet

Use the measurements at each time; a prediction does not guarantee which bottle will change most.

03 VARIABLES

I CHANGE (INDEPENDENT)	I MEASURE (DEPENDENT)

I KEEP THE SAME (CONTROLLED) · CHANGED: MEASURED WATER TEMPERATURE. MEASURED: CIRCUMFERENCE THROUGH TIME. KEEP YEAST, SUGAR, WATER VOLUME, BOTTLE AND BALLOON MATCHED.

04 MATERIALS

- ☐ 9 matching 500 mL bottles and balloons (3 per group)
- ☐ 9 tsp active dry yeast and 9 tsp sugar
- ☐ 9 × 150 mL cool (~12°C), room (~22°C) and comfortably warm (~35°C) water
- ☐ Thermometer, tray and labels
- ☐ String or flexible tape, ruler and timer

05 PROCEDURE

SAFETY Use only cool, room-temperature and comfortably warm water; do not heat water for this version. Keep bottles on a tray. Check for latex allergies before using a balloon, keep balloons away from faces, and do not taste the mixture. Do not block the bottle opening with a rigid cap.

1 **MEASURE CONDITIONS** Label cool, room and comfortably warm baths; record actual temperatures and do not heat water for this version. ☐

2 **ADD MATCHING INGREDIENTS** Prepare three bottles per condition. Measure 150 mL water, 1 teaspoon yeast and 1 teaspoon sugar for each bottle; keep the recipe matched. ☐

3 **FIT AND START** Fit and check all nine identical balloons, place bottles on a tray, and start one shared timer. ☐

4 **MEASURE BY TIME** Record every bottle's circumference at 0, 5, 10, 15 and 20 minutes. At 10 and 20 minutes, also record each bath temperature. ☐

5 **GRAPH AND EXPLAIN** Plot the three condition means over time and show each range. Balloon expansion is indirect evidence; rubber stretch and leaks affect it. ☐

DATA AND EXPLANATION

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06 RECORD YOUR OBSERVATIONS

CONDITION / BOTTLE	0 MIN (CM)	5 MIN (CM)	10 MIN (CM)	15 MIN (CM)	20 MIN (CM)
Cool · 1					
Cool · 2					
Cool · 3					
Room · 1					
Room · 2					
Room · 3					
Warm · 1					
Warm · 2					
Warm · 3					

Bath-temperature log (°C)

CONDITION	0 MIN	10 MIN	20 MIN
Cool bath			
Room bath			
Warm bath			

Record the actual shared bath temperature at each time; note any drift.

Record 0, 10 and 20 min bath temperatures separately. Keep all nine traces; for each condition and time, calculate mean = sum ÷ 3 and range = highest − lowest. Mark leaks as setup failures.

SHOW ONE CALCULATION

07 MEAN BALLOON CIRCUMFERENCE OVER TIME



Plot all five time points for each condition; add a range bar or note the range. X: Time (min)

08 EXPLAIN IT WITH EVIDENCE

CLAIM

EVIDENCE

REASONING

Reasoning must use: yeast · sugar · temperature · carbon dioxide · indirect evidence

09 THINK FURTHER

Compare two sugar amounts at one safe temperature. What stays constant?