

Build and Test Models



Grade 7 | NC.7.SP.7

Statistics and Probability

Teacher scripts, original models and student records

30 multiple-choice + 30 open/performance tasks

Worked keys, scoring and evidence records

Current NC standards for 2026-27 and 2027-28. Choose tasks across multiple sessions.
This bank is not one test.

Free sample | Contents

NC.7.SP.7 | Seventh Grade mathematics

This sample contains 19 complete selected pages from the 92-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-15, 30-31, 60, 75

Representative activities

M01: sample PDF page(s) 16; original page(s) 15

M02: sample PDF page(s) 16; original page(s) 15

O01: sample PDF page(s) 17; original page(s) 30

O02: sample PDF page(s) 18; original page(s) 31

Selected teacher prompts and keys: original page(s) 60, 75

Using this sample

Read the preparation and access guidance before using a selected activity.

Keep teacher keys and private preparation pages separate from student copies.

Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

TEACHER GUIDE

Exact standard and scope

Develop a probability model and use it to find probabilities of simple events.

- a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
- b. Develop a probability model (which may not be uniform) by repeatedly performing a chance process and observing frequencies in the data generated.
- c. Compare theoretical and experimental probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

Domain: STATISTICS AND PROBABILITY

Cluster: Investigate chance processes and develop, use, and evaluate probability models.

Current NC wording and numbering are retained. Adopted 2026 revisions beginning in 2028-29 are not substituted.

TEACHER GUIDE

Targets and evidence

Develop a uniform model and use it for a simple event.

Evidence: M01, M16, M22, M27, M30, O02, O05, O07, O08, O29

Construct an empirical, possibly nonuniform probability model.

Evidence: M11, M13, M17, M20, M23, O10, O13, O15, O20, O22

Compare theoretical and empirical probabilities and investigate discrepancies.

Evidence: M02, M05, M09, M25, M28, O01, O12, O14, O19, O30

Distinguish equal elementary outcomes from unequal label probabilities.

Evidence: M04, M08, M14, M18, M21, O03, O04, O18, O25, O28

Construct, use and check complete probability models.

Evidence: M03, M07, M15, M19, M24, O06, O16, O23, O26, O27

Explain model-data disagreement using evidence and procedures.

Evidence: M06, M10, M12, M26, M29, O09, O11, O17, O21, O24

MP2: interpret probabilities. MP3: justify models. MP4: simulate chance. MP5: choose records and representations. MP6: state assumptions and distinguish estimates from guarantees.

TEACHER GUIDE

Plan and navigation

Use four sessions of about 30-40 minutes: warm-up/model; shared/partner work; individual work; reteach/exit. Actual experiments may need an additional session. Select one M and one O task per section first, including a trial task when available. Use the rest for spaced practice; do not assign all 60 tasks in one sitting.

Warm-up: M01-M04 and O01-O04

I Do: M05-M08 and O05-O08

We Do: M09-M13 and O09-O13

Collaborative practice: M14-M18 and O14-O18

Independent practice: M19-M23 and O19-O23

Small-group reteach: M24-M27 and O24-O27

Exit ticket: M28-M30 and O28-O30

Navigation: exact standard and targets; plan/access; model and anchor; blank organizer; seven teaching scripts; choice bank; open bank; worked keys; scoring and record; official sources. Print selected student pages only; keep teacher models and keys separate.

TEACHER GUIDE

Preparation and access

Prerequisites: fractions as part of a whole, decimal comparison, equivalent fractions, multiplication of fractions and organized counting. For compound events, distinguish a whole trial from one stage.

Materials: pencils and supplied records; same-size paper cards prepared by an adult; opaque container for blind draws; optional fair number cube. No money, prizes or gambling are involved. Adults handle cutting. Use large cards; avoid small loose objects when unsuitable.

For uniform card models, each physical card must be equally likely; mix thoroughly and draw without looking. Replace and remix whenever directed. Independent stages use separate random draws. Without replacement, later choices depend on earlier draws.

Access: neutral read-aloud, enlarged print, AAC/signing, dictated explanations, student-directed scribe and assistance with motor actions. The learner must define events and direct the model. Record calculations and assistance separately; do not score handwriting or accent.

Answer-supplying cues include naming the favorable outcomes, selecting the denominator, giving the next branch or telling a learner whether the event is likely. Preserve the first response; score supported attempts separately.

Differentiate with fewer equally likely cards and a physical outcome list; extend by changing replacement or comparing nonuniform label models. N/O means unobserved, inaccessible or insufficient evidence; 0 requires an observed interpretable incorrect response. No official mastery threshold is claimed.

WORKED TEACHER MODEL

Think aloud and connect

Say: "A bag has equal-size cards A,A,B,C. A uniform model applies to the four physical cards: each has probability $1/4$. The label model is not uniform: A has $2/4=1/2$, B has $1/4$, C has $1/4$. Suppose 20 replacement draws produce A:8, B:7, C:5. The empirical model is $8/20, 7/20, 5/20$, which sums to 1. $P(A)$ differs by $|8/20-1/2|=1/10$. Random variation, poor mixing or unequal cards could explain disagreement; this short run does not prove which explanation is true."

Label	Theoretical	Observed / 20
A	$1/2$	$8/20$
B	$1/4$	$7/20$
C	$1/4$	$5/20$

Every model covers all outcomes and sums to 1. Differences call for investigation, not automatic rejection.

REPRODUCIBLE STUDENT TOOL

Chance reasoning organizer

Name: _____ Date: _____ Item: _____

Process / one complete trial / assumptions / replacement**All outcomes or trial records / event definition****Favorable count or observed count / full denominator / probability****Interpretation / model comparison / prediction limitations**

TEACHER GUIDE

Warm-up teaching script

Core: M01 and O01; other items through 04 are a later bank. Target: Compare theoretical and empirical probabilities and investigate discrepancies.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Say: "Organize what can happen or what did happen. Which outcomes count for this event? Show why your denominator includes the whole space or whole run." On independent/exist tasks do not supply outcomes or counts.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

TEACHER GUIDE

I Do teaching script

Core: M05 and O05; other items through 08 are a later bank. Target: Develop a uniform model and use it for a simple event.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Use the worked model. Name every outcome and explain the denominator. Contrast model probabilities with observed frequencies. Pause so the learner supplies the next step.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

TEACHER GUIDE

We Do teaching script

Core: M09 and O09; other items through 13 are a later bank. Target: Explain model-data disagreement using evidence and procedures.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Say: "Organize what can happen or what did happen. Which outcomes count for this event? Show why your denominator includes the whole space or whole run." On independent/exit tasks do not supply outcomes or counts.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

TEACHER GUIDE

Collaborative practice teaching script

Core: M14 and O14; other items through 18 are a later bank. Target: Compare theoretical and empirical probabilities and investigate discrepancies.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Say: "Organize what can happen or what did happen. Which outcomes count for this event? Show why your denominator includes the whole space or whole run." On independent/exist tasks do not supply outcomes or counts.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

TEACHER GUIDE

Independent practice teaching script

Core: M19 and O19; other items through 23 are a later bank. Target: Compare theoretical and empirical probabilities and investigate discrepancies.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Say: "Organize what can happen or what did happen. Which outcomes count for this event? Show why your denominator includes the whole space or whole run." On independent/exit tasks do not supply outcomes or counts.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

TEACHER GUIDE

Small-group reteach teaching script

Core: M24 and O24; other items through 27 are a later bank. Target: Explain model-data disagreement using evidence and procedures.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Say: "Organize what can happen or what did happen. Which outcomes count for this event? Show why your denominator includes the whole space or whole run." On independent/exit tasks do not supply outcomes or counts.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

TEACHER GUIDE

Exit ticket teaching script

Core: M28 and O28; other items through 30 are a later bank. Target: Distinguish equal elementary outcomes from unequal label probabilities.

Launch | 2-3 minutes

Say: "What is one whole trial? What is the event? What outcomes are possible?" Have learners restate the event before any calculation.

Model or elicit | 5-8 minutes

Say: "Organize what can happen or what did happen. Which outcomes count for this event? Show why your denominator includes the whole space or whole run." On independent/exit tasks do not supply outcomes or counts.

Listen and probe | 3-5 minutes

Ask: "Are the outcomes equally likely? What makes that assumption reasonable? Did replacement occur? Is this a theoretical model or an experimental estimate?" Look for a number from 0 to 1 and an interpretation tied to the event.

Respond | 3-5 minutes

Preserve the first response. If the denominator omits outcomes, enumerate a smaller process. If a prediction is treated as certain, compare two short authentic runs. If paths are missing, trace one first-stage branch at a time. Retry a fresh item after supported practice.

Close and record | 2-4 minutes

Each learner records an individual explanation before partner comparison. For experiments, retain every trial and tally before estimating. Early finishers change one condition and explain how the model changes. Record model, computation, interpretation, access support and any answer-supplying cue separately.

STUDENT CHOICE

Choice practice 1-2

M01 | There are 8 equal-size cards labeled 1-8, thoroughly mixed for one blind draw. The event is a label at most 1. What probability does a uniform model assign?

- A. $\frac{7}{8}$
- B. $\frac{1}{4}$
- C. $\frac{1}{8}$
- D. 1

Reasoning notes: _____

M02 | A theoretical model assigns an event probability $\frac{1}{5}$. In 20 trials it occurs 6 times. What is the absolute difference between observed relative frequency and model probability?

- A. $\frac{3}{20}$
- B. $\frac{1}{10}$
- C. $\frac{4}{5}$
- D. $\frac{3}{10}$

Reasoning notes: _____

STUDENT PERFORMANCE

001 | Warm-up

Target: Compare theoretical and empirical probabilities and investigate discrepancies.

A theoretical model assigns an event probability $\frac{1}{4}$. In 20 trials it occurs 5 times. What is the absolute difference between observed relative frequency and model probability? Calculate both rates and the absolute difference. Give two possible explanations and a fair way to gather better evidence.

Organized model, list, table or calculations

Answer / interpretation / justification

STUDENT PERFORMANCE

002 | Warm-up

Target: Develop a uniform model and use it for a simple event.

There are 10 equal-size cards labeled 1-10, thoroughly mixed for one blind draw. The event is a label at most 6. What probability does a uniform model assign? Make a model assigning a probability to every label. Identify the event labels and sum their probabilities.

Organized model, list, table or calculations

Answer / interpretation / justification

TEACHER ONLY

M worked keys 1-2

M01: C. $\frac{1}{8}$

Target: Develop a uniform model and use it for a simple event.

Each card has probability $\frac{1}{8}$. Event labels 1 through 1 give $1 \times (\frac{1}{8}) = \frac{1}{8}$. All 8 elementary probabilities sum to 1.

Option checks: $\frac{7}{8}$: This differs from the required result by $\frac{3}{4}$. Check the event definition, success count and full outcome/trial denominator; a choice alone does not diagnose the learner. $\frac{1}{4}$: This differs from the required result by $\frac{1}{8}$. Check the event definition, success count and full outcome/trial denominator; a choice alone does not diagnose the learner. 1: This differs from the required result by $\frac{7}{8}$. Check the event definition, success count and full outcome/trial denominator; a choice alone does not diagnose the learner.

M02: B. $\frac{1}{10}$

Target: Compare theoretical and empirical probabilities and investigate discrepancies.

Observed = $\frac{6}{20} = \frac{3}{10}$; difference = $|\frac{3}{10} - \frac{1}{5}| = \frac{1}{10}$. A difference alone does not prove a biased process; random variation, physical imbalance or inconsistent procedures are possible explanations.

Option checks: $\frac{3}{20}$: This differs from the required result by $\frac{1}{20}$. Check the event definition, success count and full outcome/trial denominator; a choice alone does not diagnose the learner. $\frac{4}{5}$: This differs from the required result by $\frac{7}{10}$. Check the event definition, success count and full outcome/trial denominator; a choice alone does not diagnose the learner. $\frac{3}{10}$: This differs from the required result by $\frac{1}{5}$. Check the event definition, success count and full outcome/trial denominator; a choice alone does not diagnose the learner.

TEACHER ONLY

O worked keys 1-2

001: 0

Target: Compare theoretical and empirical probabilities and investigate discrepancies.

Observed = $5/20 = 1/4$; difference = $|1/4 - 1/4| = 0$. A difference alone does not prove a biased process; random variation, physical imbalance or inconsistent procedures are possible explanations.

Accept equivalent exact fractions/decimals and valid reasoning. Require the requested model, list, table, tree or authentic record; a probability alone is incomplete evidence.

002: 3/5

Target: Develop a uniform model and use it for a simple event.

Each card has probability $1/10$. Event labels 1 through 6 give $6 \times (1/10) = 3/5$. All 10 elementary probabilities sum to 1.

Accept equivalent exact fractions/decimals and valid reasoning. Require the requested model, list, table, tree or authentic record; a probability alone is incomplete evidence.