GRADE 7 · UNIT 2

Reference Sheet

Probability — keep this in your binder

Name_____

Period_____

Use this at home to study. It is complete, so reading it is not studying — filling in the Study Guide from it is. Six things are tested; the number on the right is what each is worth of the 35.

1. Writing a Sample Space *2 points*

The sample space is the **list** of every possible outcome. Write them all out.

Worked examples

A spinner has 5 equal sections labeled A, B, C, D and E. Sample space: A, B, C, D, E

Watch out. A sample space is a list, not a count. Seventeen sections means 1, 2, … 17, not "17".

2. Finding a Theoretical Probability *5 points*

P(event) = the number of outcomes you want, over the number of outcomes in all.

Worked examples

A bag holds 20 tiles: 8 A, 5 B, 4 C and 3 D. One tile is drawn.

P(A) = $\frac{8}{20}$ 8 of the 20 tiles are A. As a percent, 8 ÷ 20 = 0.40 = 40%.

P(A or B) = $\frac{13}{20}$ "or" adds the counts: 8 + 5 = 13.

P(not C) = $\frac{16}{20} = \frac{4}{5}$ "other than C" takes the 4 C tiles away from 20.

Watch out. The bottom number is the total, before you simplify. 16/20 and 4/5 are the same answer.

3. Fractions, Decimals and Percents *11 points*

Going from	To	What you do
fraction	decimal	divide the top by the bottom
decimal	percent	the point moves 2 places right
decimal	fraction	the digits over 10, 100 or 1,000
percent	decimal	the point moves 2 places left

Decimals that stop

One zero underneath for each decimal place, then simplify.

$\frac{3}{8}$ 3 ÷ 8 = 0.375, so 37.5%

0.65 = $\frac{65}{100} = \frac{13}{20}$ = 65% 40% = 0.40 = $\frac{40}{100} = \frac{2}{5}$

Decimals that repeat

The bar covers the digits that repeat, and it stays there in the percent.

$\frac{7}{11}$ 7 ÷ 11 = 0.636363… = $0.\overline{63}$ as a percent, $63.\overline{63}\%$

Back to a fraction — the pattern, not algebra. The repeating part goes over as many 9s as it has digits.

$0.\overline{4}$ one repeating digit, so over one 9: $\frac{4}{9}$ $0.\overline{45}$ two repeating digits, so over two 9s: 45/99

If some digits come before the repeat, subtract them and put it over 90 or 900 — one 9 for each repeating digit, one 0 for each digit that does not repeat.

$0.1\overline{6}$ 16 − 1 = 15, over 90: $\frac{15}{90} = \frac{1}{6}$

$8.\overline{3}\%$ is $0.08\overline{3}$ first. 83 − 8 = 75, over 900: 75/900 = 1/12

Watch out. Never round a repeating decimal away. The percent of $\frac{5}{11}$ wants the bar, not 45.5%.

4. Comparing and Ordering Probabilities *7 points*

Every probability runs from 0 to 1. To order a list, turn them all into decimals.

Worked examples

Order these from least to greatest.

$\frac{5}{8}$	0.7	58%	13 out of 20
0.625	0.7	0.58	0.65

Least to greatest: 58%, $\frac{5}{8}$, 13 out of 20, 0.7

Watch out. A probability is never below 0 or above 1. 101%, −0.87 and 6 are not probabilities at all. *0 is impossible · under 50% unlikely · 50% equally likely as not · over 50% likely · 1 certain.*

5. Choosing a Fair Simulation Tool *7 points*

Multiply the probability by the tool's number of equal outcomes. A whole number means it works.

Worked examples

A player makes 60% of her shots. Which tools could simulate one shot?

A 10-sided die. $0.60 \times 10 = 6$. Works — 6 of the 10 count as a make.
A spinner with 5 sections. $0.60 \times 5 = 3$ sections. Works.
A deck of 16 cards. $0.60 \times 16 = 9.6$ cards. Does not work.

Watch out. The outcomes have to be **equally likely** — equal sections, a fair die. And keep a fraction as a fraction: "5 out of 7" on a 7-section spinner is 5 sections, but $5 \div 7$ rounded to 0.71, times 7, is 4.97 and you would wrongly rule it out.

6. Experimental and Theoretical Probability *3 points*

Theoretical is what *should* happen, counted. **Experimental** is what *did* happen, from running trials.

Worked examples

A fair coin. The theoretical probability of heads is $\frac{1}{2} = 0.5$.

Ana flips 24 times, 15 heads. $\frac{15}{24} = 0.625$
Ben flips 800 times, 412 heads. $412 \div 800 = 0.515$
Ben's is closer to 0.5. More trials bring the experimental probability closer to the theoretical one.

Watch out. They are not supposed to match exactly. A short run landing well off is normal.

How to study this

Two nights before. Read this through once, then do the Unit Review closed-book and mark it.
The night before. Redo on paper only the sections the review cost you.
Short on time? Section 3 alone is worth 11 of the 35 points. Start there.
On the day. Bring the Study Guide you filled in, and anything else you have written.