GRADE 7 · UNIT 5 · LESSON 2

Determining Probability

MA.7.DP.1.3

I can use the results of a trial to predict how often something happens in a larger number of trials.

Warm-Up

1. A random sample of 45 students: 9 walk. Predict for 900.
2. Area of a circle, radius 10 cm. Use $\pi = 3.14$
3. Find the mean: 8, 12, 7, 13
4. Write $\frac{18}{24}$ in lowest terms.

Warm-Up

1. A random sample of 45 students: 9 walk. Predict for 900.

   180 students

2. Area of a circle, radius 10 cm. Use $\pi = 3.14$ **314 cm²**

3. Find the mean: 8, 12, 7, 13 **10**

4. Write $\frac{18}{24}$ in lowest terms. $\frac{3}{4}$

Vocabulary

trial

one run of the experiment — one spin, one roll, one card drawn

relative frequency

how often something happened, out of how many trials

prediction

the same fraction, applied to a larger number of trials

Notes

I. Results are a fraction

Blue	Red	Green	Yellow	Total
14	11	16	9	50

$$\frac{14}{50} = \frac{7}{25} = 0.28 = 28\%$$

Notes

II. The same two moves as yesterday

1. Write the fraction: how many times it happened, out of how many tries.

2. Take that fraction of the number of tries you are asked about.

50 spins gave 14 blue. In 300 spins, expect $\frac{14}{50} \cdot 300 = 84$ blue.

Notes

III. More tries, steadier prediction

20 spins, 8 blue — the fraction jumps a long way if one spin changes.

200 spins, 54 blue — one spin barely moves it.

Both are honest. The one with more tries is the steadier estimate.

Example 1

A spinner was spun 25 times. It landed on blue 9 times.

It will be spun 400 times tomorrow.

About how many times will it land on blue?

Example 1

$$\frac{9}{25} = 0.36 = 36\%$$

$$0.36 \cdot 400 = 144$$

Answer: About 144 times

Your Turn

A spinner was spun 40 times. It landed on red 18 times.

Predict the number of reds in 500 spins.

Your Turn

A spinner was spun 40 times. It landed on red 18 times.

Predict the number of reds in 500 spins.

Fraction red: $\frac{18}{40} = \frac{9}{20}$

$\frac{9}{20} \cdot 500 = 225$

Answer: About 225 times

Example 2

Of 80 cards drawn at random, 24 were blue.

1,200 cards will be drawn this month.

About how many will be blue?

Example 2

$$\frac{24}{80} = \frac{3}{10} = 30\%$$

$$0.30 \cdot 1{,}200 = 360$$

Answer: About 360 cards

Your Turn

Of 70 cards drawn at random, 28 were green.

1,000 cards will be drawn this month. About how many will be green?

Your Turn

Of 70 cards drawn at random, 28 were green.

1,000 cards will be drawn this month. About how many will be green?

Fraction green: $\frac{28}{70} = \frac{2}{5}$

$\frac{2}{5} \cdot 1{,}000 = 400$

Answer: About 400 cards

Whiteboards · Question 1 of 9

A number cube rolled 77 times showed a 6 on 22 of the rolls.

What fraction of the rolls were a 6? Write it in lowest terms.

Answer it.

Whiteboards · Question 1 of 9

A number cube rolled 77 times showed a 6 on 22 of the rolls.

What fraction of the rolls were a 6? Write it in lowest terms.

22 of 77: $\frac{22}{77}$

Divide top and bottom by 11: $\frac{22}{77} = \frac{2}{7}$

Answer: $\frac{2}{7}$

Whiteboards · Question 2 of 9

Same cube: 22 sixes in 77 rolls. It will be rolled 560 times.

Predict the number of sixes.

Answer it.

Whiteboards · Question 2 of 9

Same cube: 22 sixes in 77 rolls. It will be rolled 560 times.

Predict the number of sixes.

$$\frac{22}{77} = \frac{2}{7}$$

$$\frac{2}{7} \cdot 560 = 160$$

Answer: About 160

Whiteboards · Question 3 of 9

In 65 draws, 26 cards were orange and 39 were not.

What fraction of the draws were orange?

A. $\frac{26}{65}$

B. $\frac{39}{65}$

C. $\frac{26}{39}$

D. $\frac{65}{26}$

Answer it.

Whiteboards · Question 3 of 9

In 65 draws, 26 cards were orange and 39 were not.

What fraction of the draws were orange?

Orange draws on top: 26. All the draws on the bottom: 65.

Answer: A — 26 of the 65 drawn

Whiteboards · Question 4 of 9

A bottle cap landed face up 12 times in 80 flips. It will be flipped 1,000 times.

Predict the number of times it lands face up.

Answer it.

Whiteboards · Question 4 of 9

A bottle cap landed face up 12 times in 80 flips. It will be flipped 1,000 times.

Predict the number of times it lands face up.

$$\frac{12}{80} = \frac{3}{20}$$

$$\frac{3}{20} \cdot 1{,}000 = 150$$

Answer: About 150

Whiteboards · Question 5 of 9

In a trial run, 24% of the parts failed inspection. 750 parts will be made tomorrow.

Predict the number of parts that fail.

Answer it.

Whiteboards · Question 5 of 9

In a trial run, 24% of the parts failed inspection. 750 parts will be made tomorrow.

Predict the number of parts that fail.

$$24\% = 0.24$$

$$0.24 \cdot 750 = 180$$

Answer: About 180

Whiteboards · Question 6 of 9

Two students spin the same spinner.

Whose results give the steadier estimate?

A. Ana: 32 spins, 13 blue.

B. Neither: their fractions differ, so one is wrong.

C. Ana: 13 of 32 is the bigger fraction.

D. Ben: 320 spins, 88 blue.

Answer it.

Whiteboards · Question 6 of 9

Two students spin the same spinner.

Whose results give the steadier estimate?

Ben made 320 spins. Ana made 32.

More tries gives a steadier fraction.

Answer: D — 320 spins

Whiteboards · Question 7 of 9

Over 3 days, a number cube rolled 90 times showed a 6 on 15 rolls. It will be rolled 450 times.

Predict the number of sixes.

Answer it.

Whiteboards · Question 7 of 9

Over 3 days, a number cube rolled 90 times showed a 6 on 15 rolls. It will be rolled 450 times.

Predict the number of sixes.

$$\frac{15}{90} = \frac{1}{6}$$

$$\frac{1}{6} \cdot 450 = 75$$

Answer: 75

Whiteboards · Question 8 of 9

Of 140 cards drawn at random, 35 were yellow. 2,000 cards will be drawn this year.

Predict the number of yellows.

Answer it.

Whiteboards · Question 8 of 9

Of 140 cards drawn at random, 35 were yellow. 2,000 cards will be drawn this year.

Predict the number of yellows.

$$\frac{35}{140} = \frac{1}{4}$$

$$\frac{1}{4} \cdot 2{,}000 = 500$$

Answer: About 500

Whiteboards · Question 9 of 9

Kai spun a spinner 30 times. Zoe spun the same spinner 300 times.

Each predicted the blues in 600 spins. Whose prediction would you use, and why?

Write your answer in sentences.

Whiteboards · Question 9 of 9

Kai spun a spinner 30 times. Zoe spun the same spinner 300 times.

Each predicted the blues in 600 spins. Whose prediction would you use, and why?

Zoe's fraction comes from ten times as many spins.

One spin changes Kai's fraction by $\frac{1}{30}$, but Zoe's by only $\frac{1}{300}$.

Answer: Zoe's. More tries makes the fraction steadier, so it is a better estimate.

Independent Practice

1. A spinner landed on red 16 times in 40 spins. Write the fraction in lowest terms.
2. Use that fraction to predict the number of reds in 300 spins.
3. In a trial run, 45% of the seeds sprouted. Predict how many of 600 seeds will sprout.
4. Over 2 weeks, a cube was rolled 36 times and showed a 4 on 9 rolls. Predict the fours in 800 rolls.
5. Mia spun 25 times; Leo spun 250 times. Whose fraction is the steadier estimate, and why?
6. Of 90 cards drawn at random, 27 were blue. Predict the blues in 1,500 draws, then say in one sentence why another 90 draws might give a different answer.

Before You Go

The bottom of the fraction is how many tries.

A prediction from results is an estimate.

Tomorrow: the same two moves, in percent.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 60. No new skill today: the plan lists none for 5.02. Keep YHZ and B9Z going to 60: every Unit 5 skill is due by the Unit 5 test.

Today's skills — all required

Populations and samples (YHZ)

Identify representative and random samples (B9Z)