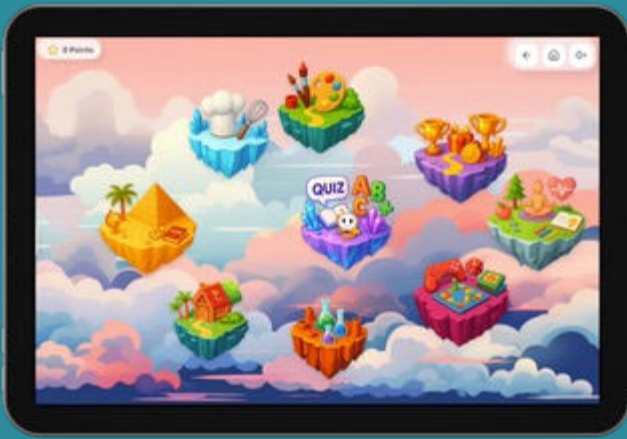


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Probability - Year 6

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PROBABILITY SCALE



IMPOSSIBLE

Rolling a 7 on a fair six-sided die



UNLIKELY

Picking blue from a bag with 1 blue and 3 red counters



EVEN CHANCE

Tossing heads on a fair coin



LIKELY

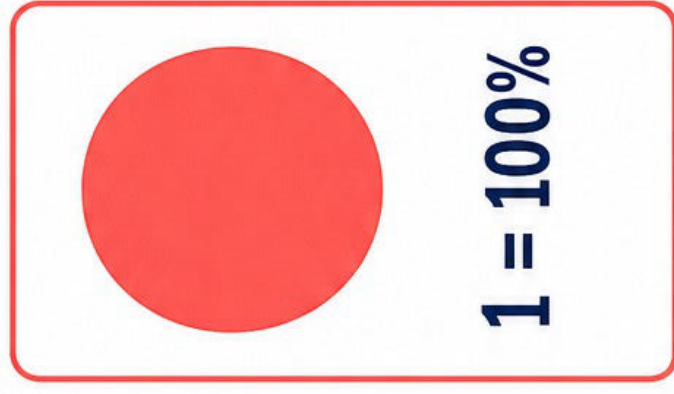
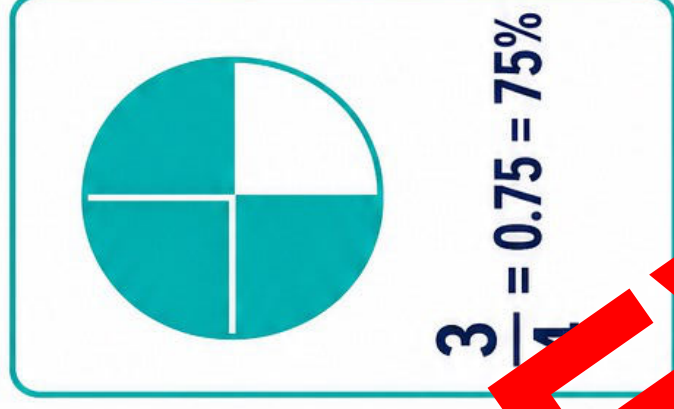
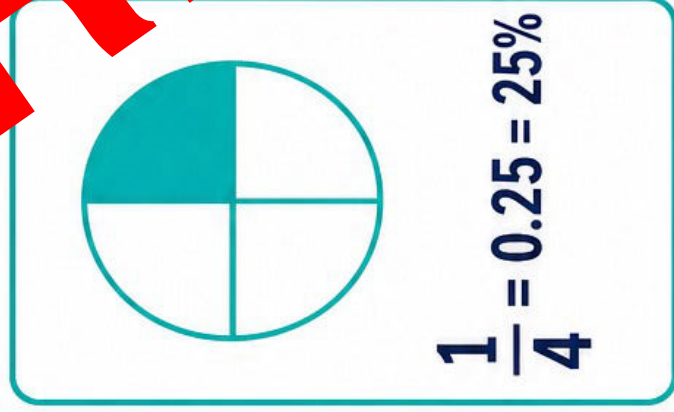
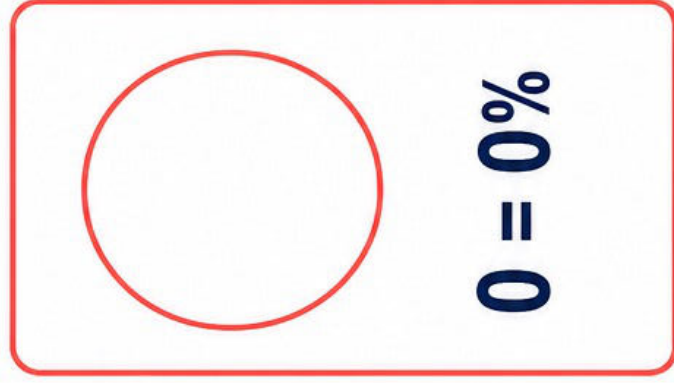
Picking red from a bag with 3 red and 1 blue counter



CERTAIN

The day after Monday is Tuesday

ONE CHANCE, THREE FORMS



PROBABILITY REFERENCE



KEY WORDS

impossible = 0

unlikely = less than $\frac{1}{2}$

even chance = $\frac{1}{2}$

likely = more than $\frac{1}{2}$

certain = 1



HOW TO CALCULATE

probability = favourable outcomes ÷ total equally likely outcomes



EXPECTED FREQUENCY

expected frequency = probability × number of trials



RELATIVE FREQUENCY

relative frequency = observed frequency ÷ number of trials

0

$\frac{1}{2}$

1

IMPOSSIBLE

EVEN CHANCE

CERTAIN

CHANCE CHECK-IN

Name: _____

1. Mark 0.2, 0.5 and 0.9 on the probability scale. Label each unlikely, even chance or likely.



2. Convert $\frac{3}{5}$ to a decimal and a percentage.

Decimal: _____

Percentage: _____

3. How many heads are expected in 40 tosses of a fair coin? Show your calculation.

4. A fair coin lands heads _____ times in 40 tosses. Compare this result with the expected number of heads.

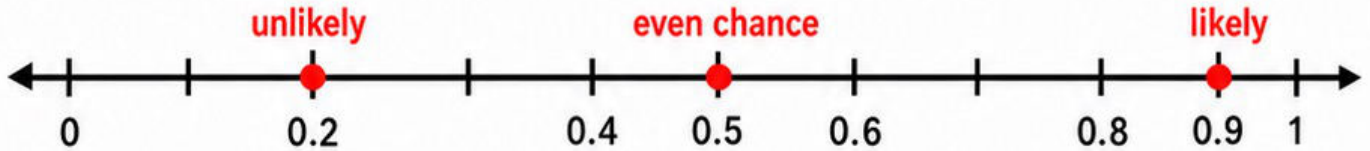
5. Why would 400 coin tosses usually give a more stable relative frequency than 20 tosses?

6. A fair coin has landed tails five times in a row. What is the probability of heads on the next toss? Explain.

CHANCE CHECK-IN

Name: ANSWERS

1. Mark 0.2, 0.5 and 0.9 on the probability scale. Label each unlikely, even chance or likely.



2. Convert $\frac{3}{5}$ to a decimal and a percentage.

Decimal: 0.6

Percentage: 60%

3. How many heads are expected in 40 tosses of a fair coin? Show your calculation.

$$40 \times \frac{1}{2} = 20 \text{ heads}$$

4. A fair coin lands heads 13 times in 40 tosses. Compare this result with the expected number of heads.

13 heads is lower than the expected 20 heads.

5. Why would 400 coin tosses usually give a more stable relative frequency than 20 tosses?

With more trials, random variation has less effect on the overall proportion, so the relative frequency is usually more stable.

6. A fair coin has landed tails five times in a row. What is the probability of heads on the next toss? Explain.

$\frac{1}{2}$. Fair coin tosses are independent, so the earlier tails do not change the next toss.

PROBABILITY SCALE AND LANGUAGE

Name: _____

	Event	Chance word	Fraction	Decimal	Percentage
A	Roll above 4 on a fair six-sided die.				
B	Select a vowel from A, E, I, O, U.				
C	Select blue from a bag with 1 blue and 4 orange counters.				
D	The day after Monday is Tuesday.				
E	Roll a 9 on a fair six-sided die.				
F	Spin a spinner with 4 equal sections, 2 of which are blue.				

Write each event's exact probability.

A	B	C	D	E	F

Order A–F from least likely to most likely. Use = for equal probabilities.



PROBABILITY SCALE AND LANGUAGE

Name: ANSWERS

	Event	Chance word	Fraction	Decimal	Percentage
A	Roll above 4 on a fair six-sided die.	unlikely	$\frac{1}{3}$	0.333	33.3%
B	Select a vowel from A, E, I, O, U.	certain	1	1	100%
C	Select blue from a bag with 1 blue and 4 orange counters.	unlikely	$\frac{1}{5}$	0.2	20%
D	The day after Monday is Tuesday.	certain	1	1	100%
E	Roll a 9 on a fair six-sided die.	impossible	0	0	0%
F	Land on red on a spinner with 4 equal sections, 3 of which are blue.	likely	$\frac{3}{4}$	0.75	75%

Write each event's exact probability.

A	B	C	D	E	F
$\frac{1}{3}$	1	$\frac{1}{5}$	1	0	$\frac{3}{4}$

Order A–F from least likely to most likely. Use = for equal probabilities.

$$E < C < A < F < B = D$$

CONVERTING PROBABILITY FORMS – CORE

Name: _____

fraction → decimal: divide numerator by denominator

decimal → percentage: multiply by 100

percentage → decimal: divide by 100

	Fraction	Decimal	Percentage
1.	$\frac{1}{2}$		
2.		0.2	
3.			75%
4.	$\frac{3}{10}$		
5.		0.625	
6.			40%
7.	$\frac{7}{8}$		
8.		0.05	
9.			90%
10.	$\frac{1}{6}$		

Round repeating decimals to three decimal places and percentages to one decimal place.

CONVERTING PROBABILITY FORMS – CORE

Name: ANSWERS

fraction → decimal: divide numerator by denominator

decimal → percentage: multiply by 100

percentage → decimal: divide by 100

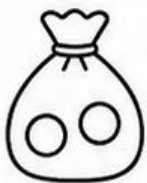
	Fraction	Decimal	Percentage
1.	$\frac{1}{2}$	0.5	50%
2.	$\frac{1}{5}$	0.2	20%
3.	$\frac{3}{4}$	0.75	75%
4.	$\frac{3}{10}$	0.3	30%
5.	$\frac{5}{8}$	0.625	62.5%
6.	$\frac{2}{5}$	0.4	40%
7.	$\frac{7}{8}$	0.875	87.5%
8.	$\frac{1}{20}$	0.05	5%
9.	$\frac{9}{10}$	0.9	90%
10.	$\frac{1}{6}$	0.167	16.7%

Round repeating decimals to three decimal places and percentages to one decimal place.

CONVERTING PROBABILITY FORMS – REASONING

Name: _____

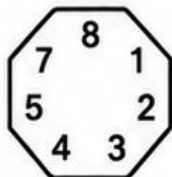
1.



A bag has 4 blue and 6 orange counters. What is $P(\text{blue})$?

Fraction: _____ Decimal: _____ Percentage: _____

2.



A fair eight-sided die is numbered 1–8. What is $P(\text{even})$?

Fraction: _____ Decimal: _____ Percentage: _____

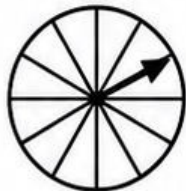
3.



What is $P(\text{heart})$ when one card is drawn from a standard 52-card deck?

Fraction: _____ Decimal: _____ Percentage: _____

4.



A spinner has 3 winning sectors out of 8 equal sectors. What is $P(\text{win})$?

Fraction: _____ Decimal: _____ Percentage: _____

5.



The probability of rain is 50%. What is $P(\text{no rain})$?

Fraction: _____ Decimal: _____ Percentage: _____

6.



What is $P(\text{rolling 2 or less on a fair six-sided die})$?

Fraction: _____ Decimal: _____ Percentage: _____

7. Which is more likely: $P(\text{blue})$ in Question 1 or $P(\text{win})$ in Question 4? Explain.

8. Which is more likely: $P(\text{even})$ in Question 2 or $P(\text{no rain})$ in Question 5? Explain.

9. Create a different chance context. Give its probability in all three forms.

Fraction: _____

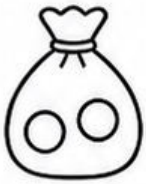
Decimal: _____

Percentage: _____

CONVERTING PROBABILITY FORMS – REASONING

Name: ANSWERS

1.



A bag has 4 blue and 6 orange counters. What is $P(\text{blue})$?

Fraction: $\frac{2}{5}$ Decimal: 0.4 Percentage: 40%

2.



A fair eight-sided die is numbered 1–8. What is $P(\text{even})$?

Fraction: $\frac{1}{2}$ Decimal: 0.5 Percentage: 50%

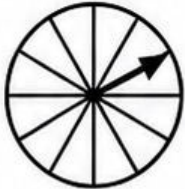
3.



What is $P(\text{heart})$ when one card is drawn from a standard 52-card deck?

Fraction: $\frac{1}{4}$ Decimal: 0.25 Percentage: 25%

4.



A spinner has 3 winning sectors out of 8 equal sectors. What is $P(\text{win})$?

Fraction: $\frac{3}{8}$ Decimal: 0.375 Percentage: 37.5%

5.



The probability of rain is 35%. What is $P(\text{no rain})$?

Fraction: $\frac{65}{100}$ Decimal: 0.65 Percentage: 65%

6.



What is $P(\text{rolling 2 or less on a fair six-sided die})$?

Fraction: $\frac{1}{3}$ Decimal: 0.333 Percentage: 33.3%

7.

Which is more likely: $P(\text{blue})$ in Question 1 or $P(\text{win})$ in Question 4? Explain.

$P(\text{blue})$ is more likely: $0.4 > 0.25$.

8.

Which is more likely: $P(\text{even})$ in Question 2 or $P(\text{no rain})$ in Question 5? Explain.

$P(\text{no rain})$ is more likely: $0.65 > 0.5$.

9.

Create a different chance context. Give its probability in all three forms.

Example: heads on a fair coin

Fraction: $\frac{1}{2}$ Decimal: 0.5 Percentage: 50%

EXPECTED FREQUENCY — FROM CHANCE TO COUNT

Name: _____

$$\text{expected frequency} = \text{probability} \times \text{number of trials}$$

1. Expected heads in 20 tosses of a fair coin.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

2. Expected sixes in 60 rolls of a fair six-sided die.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

3. A spinner has 3 red sections out of 4 equal sections. Expected reds in 100 spins.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

4. A spinner has 2 blue sections out of 5 equal sections. Expected blues in 200 spins.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

5. A bag has 3 green counters out of 10. Expected greens in 500 draws with replacement.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

6. Expected hearts in 120 card draws with replacement from a standard deck.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

7. Expected even numbers in 60 rolls of a fair six-sided die.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

8. A bag has 7 orange counters out of 20. Expected oranges in 200 draws with replacement.

Probability: _____ $\times$ Number of trials: _____ = _____

Expected count: _____

Show the probability, multiplication and expected count for each task.

EXPECTED FREQUENCY — FROM CHANCE TO COUNT

Name: ANSWERS

$$\text{expected frequency} = \text{probability} \times \text{number of trials}$$

1. Expected heads in 20 tosses of a fair coin.

Probability: $\frac{1}{2}$ $\times$ Number of trials: 20 = 10

Expected count: 10 heads

2. Expected sixes in 60 rolls of a fair six-sided die.

Probability: $\frac{1}{6}$ $\times$ Number of trials: 60 = 10

Expected count: 10 sixes

3. A spinner has 3 red sections out of 4 equal sections. Expected reds in 80 spins.

Probability: $\frac{3}{4}$ $\times$ Number of trials: 80 = 60

Expected count: 60 reds

4. A spinner has 2 blue sections out of 5 equal sections. Expected blues in 200 spins.

Probability: $\frac{2}{5}$ $\times$ Number of trials: 200 = 80

Expected count: 80 blues

5. A bag has 3 green counters out of 10. Expected greens in 500 draws with replacement.

Probability: $\frac{3}{10}$ $\times$ Number of trials: 500 = 150

Expected count: 150 greens

6. Expected hearts in 120 card draws with replacement from a standard deck.

Probability: $\frac{1}{4}$ $\times$ Number of trials: 120 = 30

Expected count: 30 hearts

7. Expected even numbers in 60 rolls of a fair six-sided die.

Probability: $\frac{1}{2}$ $\times$ Number of trials: 60 = 30

Expected count: 30 even numbers

8. A bag has 7 orange counters out of 20. Expected oranges in 200 draws with replacement.

Probability: $\frac{7}{20}$ $\times$ Number of trials: 200 = 70

Expected count: 70 oranges

Show the probability, multiplication and expected count for each task.

SCALING EXPECTED OUTCOMES

Name: _____

Use the sample proportion to estimate a larger expected count.

A. WILDLIFE SIGHTINGS

In a sample of 20 sightings, there were 8 rosellas, 7 magpies and 5 cockatoos.

	Sample count	Fraction of sample	Expected in 200
Rosellas	8		
Magpies	7		
Cockatoos	5		

Calculation: _____

B. TOKEN BAG

A sample of 10 tokens contains 5 teal, 3 coral and 2 yellow tokens.

	Sample count	Fraction of sample	Expected in 100	Expected in 500
Teal	5			
Coral	3			
Yellow	2			

Why are these expected counts rather than guaranteed results?



SCALING EXPECTED OUTCOMES

Name: ANSWERS

Use the sample proportion to estimate a larger expected count.

A. WILDLIFE SIGHTINGS

In a sample of 20 sightings, there were 8 rosellas, 7 magpies and 5 cockatoos.

	Sample count	Fraction of sample	Expected in 200
Rosellas	8	$8/20 = 2/5$	80
Magpies	7	$7/20$	70
Cockatoos	5	$5/20 = 1/4$	50

Calculation: Scale 20 to 200 by multiplying each count by 10.

B. TOKEN BAG

A sample of 10 tokens contains 5 teal, 3 coral and 2 yellow tokens.

	Sample count	Fraction of sample	Expected in 100	Expected in 500
Teal	5	$5/10 = 1/2$	50	250
Coral	3	$3/10$	30	150
Yellow	2	$2/10 = 1/5$	20	100

Why are these expected counts rather than guaranteed results?

These are expectations, not guarantees,

because random chance can make observed results vary.

REPEATED TRIALS LAB — RECORD

Name: _____

Materials: fair coin, paperclip, pencil, four-section spinner

1. FAIR COIN — 40 TOSSES

Toss the coin 40 times. Record each result.

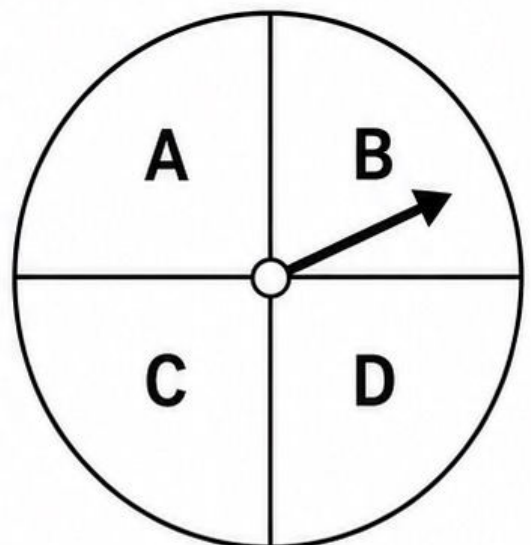
	Tally	Frequency	Relative frequency
Heads			
Tails			

Tosses 1–10	
11–20	
21–30	
31–40	

2. FOUR-SECTION SPINNER — 40 SPINS

Spin 40 times. Record A, B, C or D.

	Tally	Frequency	Relative frequency
A			
B			
C			
D			



Check: each frequency table must total 40.

REPEATED TRIALS LAB – ANALYSE

Name: _____

Use your results from REPEATED TRIALS LAB – RECORD.

1. Calculate the relative frequencies of heads and tails. Do they total 1?

Heads relative frequency = _____

Tails relative frequency = _____

2. Compare your coin results with the theoretical probability of $\frac{1}{2}$ for each outcome.

3. Calculate the relative frequency of A, B, C and D. Compare each with the theoretical probability of $\frac{1}{4}$.

Outcome	Frequency	Relative frequency	Theoretical probability
A			
B			
C			
D			

4. Why might your observed results differ from the theoretical probabilities?

5. Predict what would usually happen to the relative frequencies if you completed 160 more trials, for 200 trials in total.

6. A fair coin has landed tails five times in a row. What is $P(\text{heads})$ on the next toss? Explain.

REPEATED TRIALS LAB – ANALYSE

Name: ANSWERS

Use your results from REPEATED TRIALS LAB – RECORD.

1. Calculate the relative frequencies of heads and tails. Do they total 1?

Heads relative frequency = answers vary; heads frequency $\div$ 40

Tails relative frequency = answers vary; tails frequency $\div$ 40; yes, the two relative frequencies total 1

2. Compare your coin results with the theoretical probability of $1/2$ for each outcome.

Answers vary. Compare each observed relative frequency with $1/2$.

3. Calculate the relative frequency of A, B, C and D. Compare each with the theoretical probability of $1/4$.

Outcome	Frequency	Relative frequency	Theoretical probability
A	answers vary	answers vary	$1/4$
B	answers vary	answers vary	$1/4$
C	answers vary	answers vary	$1/4$
D	answers vary	answers vary	$1/4$

4. Why might your observed results differ from the theoretical probabilities?

Random chance creates variation, especially in a small number of trials.

5. Predict what would usually happen to the relative frequencies if you completed 160 more trials, for 200 trials in total.

With 200 trials, the relative frequencies would usually be more stable and closer to the theoretical probabilities.

6. A fair coin has landed tails five times in a row. What is $P(\text{heads})$ on the next toss? Explain.

$1/2$. Tosses are independent, so the previous tails do not change the next toss.

TWO-DICE SIMULATION – THEORETICAL MODEL

Name: _____



Two fair six-sided dice create 36 equally likely ordered pairs.

Sum	Number of ordered pairs	Theoretical fraction	Percentage
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

1. Which sum is most likely? Explain using ordered pairs.

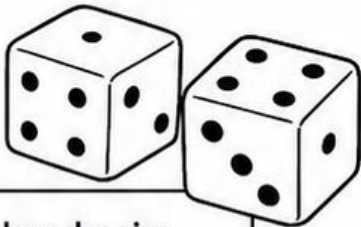
2. Why are sums 2 and 12 less likely than sum 7?

3. Check: do all theoretical probabilities total 1 or 100%?

TWO-DICE SIMULATION – THEORETICAL MODEL

Name: _____

ANSWERS



Two fair six-sided dice create 36 equally likely ordered pairs.

Sum	Number of ordered pairs	Theoretical fraction	Percentage
2	1	$\frac{1}{36}$	2.8%
3	2	$\frac{2}{36}$	5.6%
4	3	$\frac{3}{36}$	8.3%
5	4	$\frac{4}{36}$	11.1%
6	5	$\frac{5}{36}$	13.9%
7	6	$\frac{6}{36} = \frac{1}{6}$	16.7%
8	5	$\frac{5}{36}$	13.9%
9	4	$\frac{4}{36}$	11.1%
10	3	$\frac{3}{36}$	8.3%
11	2	$\frac{2}{36}$	5.6%
12	1	$\frac{1}{36}$	2.8%

1. Which sum is most likely? Explain using ordered pairs.

Sum 7, it has 6 ordered pairs.

2. Why are sums 2 and 12 less likely than sum 7?

Sums 2 and 12 each have only 1 ordered pair.

3. Check: do all theoretical probabilities total 1 or 100%?

Yes. Exact fractions total 1; rounded percentages total approximately 100%.

TWO-DICE SIMULATION — 100 TRIALS

Name: _____

Use a digital tool to roll two fair six-sided dice 100 times. Add the dice, then record each sum.

Sum	Occurrences	Relative frequency
Sum 2		
Sum 3		
Sum 4		
Sum 5		
Sum 6		
Sum 7		
Sum 8		
Sum 9		
Sum 10		
Sum 11		
Sum 12		

1. Which sum occurred most often?

2. Compare your results with the theoretical distribution from the previous page.

3. Why might your observed frequencies differ from the theoretical probabilities?

4. Predict how the relative frequencies would usually change after 500 trials.

Check: occurrences must total 100.

TWO-DICE SIMULATION — 100 TRIALS

Name: ANSWERS

Use a digital tool to roll two fair six-sided dice 100 times. Add the dice, then record each sum.

Sum	Occurrences	Relative frequency
Sum 2	results vary	results vary
Sum 3	results vary	results vary
Sum 4	results vary	results vary
Sum 5	results vary	results vary
Sum 6	results vary	results vary
Sum 7	results vary	results vary
Sum 8	results vary	results vary
Sum 9	results vary	results vary
Sum 10	results vary	results vary
Sum 11	results vary	results vary
Sum 12	results vary	results vary

1. Which sum occurred most often?

Results vary. Theory predicts that sum 7 is most likely.

2. Compare your results with the theoretical distribution from the previous page.

Results should be broadly similar to the theoretical pattern, but not exact.

3. Why might your observed frequencies differ from the theoretical probabilities?

Random chance causes variation in a finite number of trials.

4. Predict how the relative frequencies would usually change after 500 trials.

After 500 trials, the relative frequencies would usually be more stable and closer to the theoretical probabilities.

Check: occurrences must total 100.

TWO-DICE SIMULATION — COMPARE TRIAL SIZES

Name: _____



The theoretical probability of a sum of 7 is $\frac{1}{6} \approx 16.7\%$.

Number of trials	Occurrences of sum 7	Relative frequency	Distance from 16.7%
100	12		
500	78		
1,000	169		

1. Calculate each relative frequency as a percentage.

2. Calculate the absolute distance from 16.7% in percentage points.

3. Which result is closest to the theoretical probability? Does more trials guarantee an exact result?

4. Write a conclusion about trial size and relative-frequency stability.

TWO-DICE SIMULATION — COMPARE TRIAL SIZES

Name: _____

ANSWERS



The theoretical probability of a sum of 7 is $\frac{1}{6} \approx 16.7\%$.

Number of trials	Occurrences of sum 7	Relative frequency	Distance from 16.7%
100	12	12%	4.7 percentage points
500	78	15.6%	1.1 percentage points
1,000	169	16.9%	0.2 percentage points

1. Calculate each relative frequency as a percentage.

$12 \div 100 = 12\%$; $78 \div 500 = 15.6\%$; $169 \div 1,000 = 16.9\%$

2. Calculate the absolute distance from 16.7% in percentage points.

Distances: 4.7 and 1.1 percentage points.

3. Which result is closest to the theoretical probability? Does more trials guarantee an exact result?

The 1,000-trial result is closest. More trials do not guarantee an exact result.

4. Write a conclusion about trial size and relative-frequency stability.

As trial size increases, relative frequencies generally become more stable and closer to the theoretical probability.

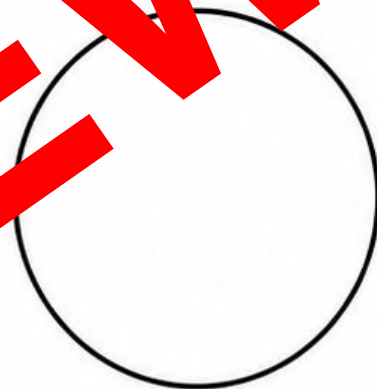
PROBABILITY REASONING CHALLENGE

Name: _____

1. If $P(\text{red}) = 0.32$, find $P(\text{not red})$. Explain the complement rule.

2. Which is greater: $\frac{5}{8}$ or 0.6? Show both as decimals or percentages.

3. Design a spinner with an exact 45% chance of winning.
State the number of equal sectors and winning sectors.



4. A model gives three outcomes with probabilities: 0.25, 0.40 and 0.45.
Explain why the model is impossible.

5. A fair die has rolled six four times in a row.
A player says, 'Six cannot happen next.' Critique the claim.

6. A spinner designer claims $P(\text{red}) = 0.30$.
Plan a digital simulation that could test the claim.
Include a sensible trial count, what to record and how to compare results.

PROBABILITY REASONING CHALLENGE

Name: ANSWERS

1. If $P(\text{red}) = 0.32$, find $P(\text{not red})$. Explain the complement rule.

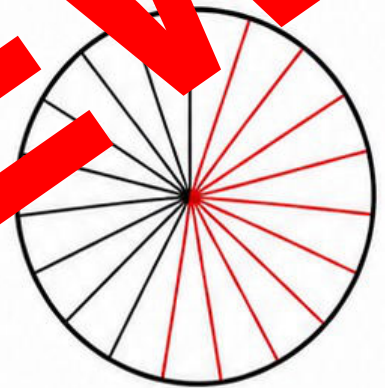
$P(\text{not red}) = 1 - 0.32 = 0.68$. Complementary probabilities total 1.

2. Which is greater: $\frac{5}{8}$ or 0.6? Show both as decimals or percentages.

$\frac{5}{8} = 0.625 = 62.5\%$, which is greater than $0.6 = 60\%$.

3. Design a spinner with an exact 45% chance of winning.
State the number of equal sectors and winning sectors.

Example: 20 equal sectors with 9 winning sectors; $\frac{9}{20} = 45\%$.



4. A model gives three outcome probabilities: 0.25, 0.40 and 0.45.
Explain why the model is impossible.

$0.25 + 0.40 + 0.45 = 1.10$. A complete model must total 1.

5. A fair die has rolled six four times in a row.
A player says, 'Six cannot happen next.' Critique the claim.

The claim is false. Rolls are independent, so $P(\text{six})$ is still $\frac{1}{6}$.

6. A spinner designer claims $P(\text{red}) = 0.30$.
Plan a digital simulation that could test the claim.
Include a sensible trial count, what to record and how to compare results.

Example: run 1,000 spins, record the number of reds, calculate red frequency $\div 1,000$, then compare the relative frequency with 0.30. Other valid plans accepted.



CHANCE MATCH



START	A Roll 7 on a fair six-sided die	B Draw 1 sector out of 10 equal sectors	C 1 blue counter and 7 red counters	D Roll a 6 on a fair six-sided die	E 1 green counter and 4 orange counters																							
T Roll a number from 1 to 6 on a fair die	<table><tr><td> 1 $0 = 0\%$ </td><td> 2 $\frac{1}{10} = 0.1 = 10\%$ </td><td> 3 $\frac{1}{8} = 0.125 = 12.5\%$ </td><td> 4 $\frac{1}{6} \approx 0.167 \approx 16.7\%$ </td><td> 5 $\frac{1}{5} = 0.2 = 20\%$ </td></tr><tr><td> 6 $\frac{1}{4} = 0.25 = 25\%$ </td><td> 7 $\frac{3}{10} = 0.3 = 30\%$ </td><td> 8 $\frac{1}{3} \approx 0.333 \approx 33.3\%$ </td><td> 9 $\frac{2}{5} = 0.4 = 40\%$ </td><td> 10 $\frac{9}{20} = 0.45 = 45\%$ </td></tr><tr><td> 11 $\frac{1}{2} = 0.5 = 50\%$ </td><td> 12 $\frac{11}{20} = 0.55 = 55\%$ </td><td> 13 $\frac{3}{5} = 0.6 = 60\%$ </td><td> 14 $\frac{2}{3} \approx 0.667 \approx 66.7\%$ </td><td> 15 $\frac{7}{10} = 0.7 = 70\%$ </td></tr><tr><td> 16 $\frac{3}{4} = 0.75 = 75\%$ </td><td> 17 $\frac{4}{5} = 0.8 = 80\%$ </td><td> 18 $\frac{5}{6} \approx 0.833 \approx 83.3\%$ </td><td> 19 $\frac{7}{8} = 0.875 = 87.5\%$ </td><td> 20 $1 = 100\%$ </td></tr></table>				1 $0 = 0\%$	2 $\frac{1}{10} = 0.1 = 10\%$	3 $\frac{1}{8} = 0.125 = 12.5\%$	4 $\frac{1}{6} \approx 0.167 \approx 16.7\%$	5 $\frac{1}{5} = 0.2 = 20\%$	6 $\frac{1}{4} = 0.25 = 25\%$	7 $\frac{3}{10} = 0.3 = 30\%$	8 $\frac{1}{3} \approx 0.333 \approx 33.3\%$	9 $\frac{2}{5} = 0.4 = 40\%$	10 $\frac{9}{20} = 0.45 = 45\%$	11 $\frac{1}{2} = 0.5 = 50\%$	12 $\frac{11}{20} = 0.55 = 55\%$	13 $\frac{3}{5} = 0.6 = 60\%$	14 $\frac{2}{3} \approx 0.667 \approx 66.7\%$	15 $\frac{7}{10} = 0.7 = 70\%$	16 $\frac{3}{4} = 0.75 = 75\%$	17 $\frac{4}{5} = 0.8 = 80\%$	18 $\frac{5}{6} \approx 0.833 \approx 83.3\%$	19 $\frac{7}{8} = 0.875 = 87.5\%$	20 $1 = 100\%$	F Draw a heart from a standard deck	G 3 red sectors out of 10 equal sectors	H Roll above 4 on a fair six-sided die	I 2 blue counters and 3 red counters
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CHANCE MATCH — CARDS & RULES

$0 = 0\%$	$\frac{1}{10} = 0.1 = 10\%$	$\frac{1}{8} = 0.125 = 12.5\%$	$\frac{1}{6} \approx 0.167 \approx 16.7\%$	$\frac{1}{5} = 0.2 = 20\%$
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2–4 players. Cut out and shuffle the cards. On your turn, draw one card and find the matching event on the board.
If correct, move to that event. First to FINISH wins.

TEACHER CHECK — CUT OFF BEFORE STARTING

A–1, B–2, C–3, D–4, E–5, F–6, G–7, H–8, I–9, J–10, K–11, L–12, M–13, N–14, O–15, P–16, Q–17, R–18, S–19, T–20.

PROBABILITY INVESTIGATION STATIONS

1. Form a team and start at your assigned station.
2. Roll a fair die until you get 1– then solve that numbered operation card. Your teacher may assign a card instead.
3. Record one agreed answer on the score sheet.
4. Check with your teacher, then spin for your score.
5. Rotate when the signal sounds.

Materials:

station cards, score sheet, cards, dice, coins, counters, pencil and digital tool.



SCORE SPINNER

PROBABILITY STATIONS SCORE SHEET

Team: _____ layers: _____

Record one agreed answer at each station. Ask your teacher to check it before spinning.

	Agreed answer	Teacher check	Spin score
Station 1			
Station 2			
Station 3			
Station 4			
Station 5			
TOTAL SCORE			

EXTENSION: Predict the most common and least common sums when two dice are rolled. Explain.

STATION 1 — PLAYING CARDS

REFERENCE

STANDARD DECK: 52 cards • 4 suits • 13 cards per suit • 26 red • 26 black



1

What is $P(\text{heart})$?

Give a fraction, decimal and percentage.

2

What is $P(\text{black jack})$?

Give a simplified fraction.

3

What is $P(\text{red card})$?

Explain why it is an even chance.

4

How many queens are

expected in 26 card draws with replacement?

Show the calculation.

Record one agreed answer on your score sheet.

STATION 2 – DICE DATA



A fair six-sided die was rolled 120 times.

Face	1	2	3	4	5	6
Frequency	18	24	20	20	22	20

✓ Total = 120

1 What frequency was expected for each face?

2 Which face was most over-represented? By how many?

3 Which face was most under-represented? By how many?

4 How many of each face are expected in 300 rolls?

Record one agreed answer on your score sheet.

STATION 3 – COIN TOSSES



HEADS

TAILS

Equally
likely

Equally
likely

A fair coin has two equally likely outcomes. Each new toss is independent.

1 Is a run of 10 heads possible? Explain.

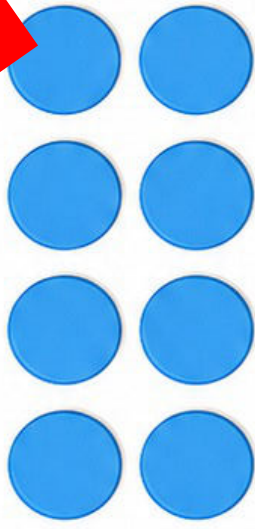
2 After one head, what is $P(\text{heads})$ on the next toss?

3 After three tails, what is $P(\text{heads})$ on the next toss? Explain.

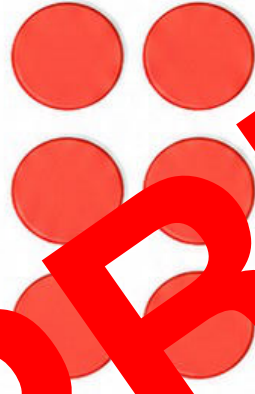
4 How many tails are expected in 1,000 tosses?

Record one agreed answer on your score sheet.

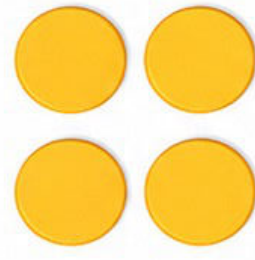
STATION 4 — MYSTERY BAG



8 blue



6 red



4 yellow



2 green

20 counters: 8 blue • 6 red • 4 yellow • 2 green

1

What is $P(\text{blue})$?
Give a fraction,
decimal and
percentage.

2

Which is more
likely: red or
yellow? By how
much?

3

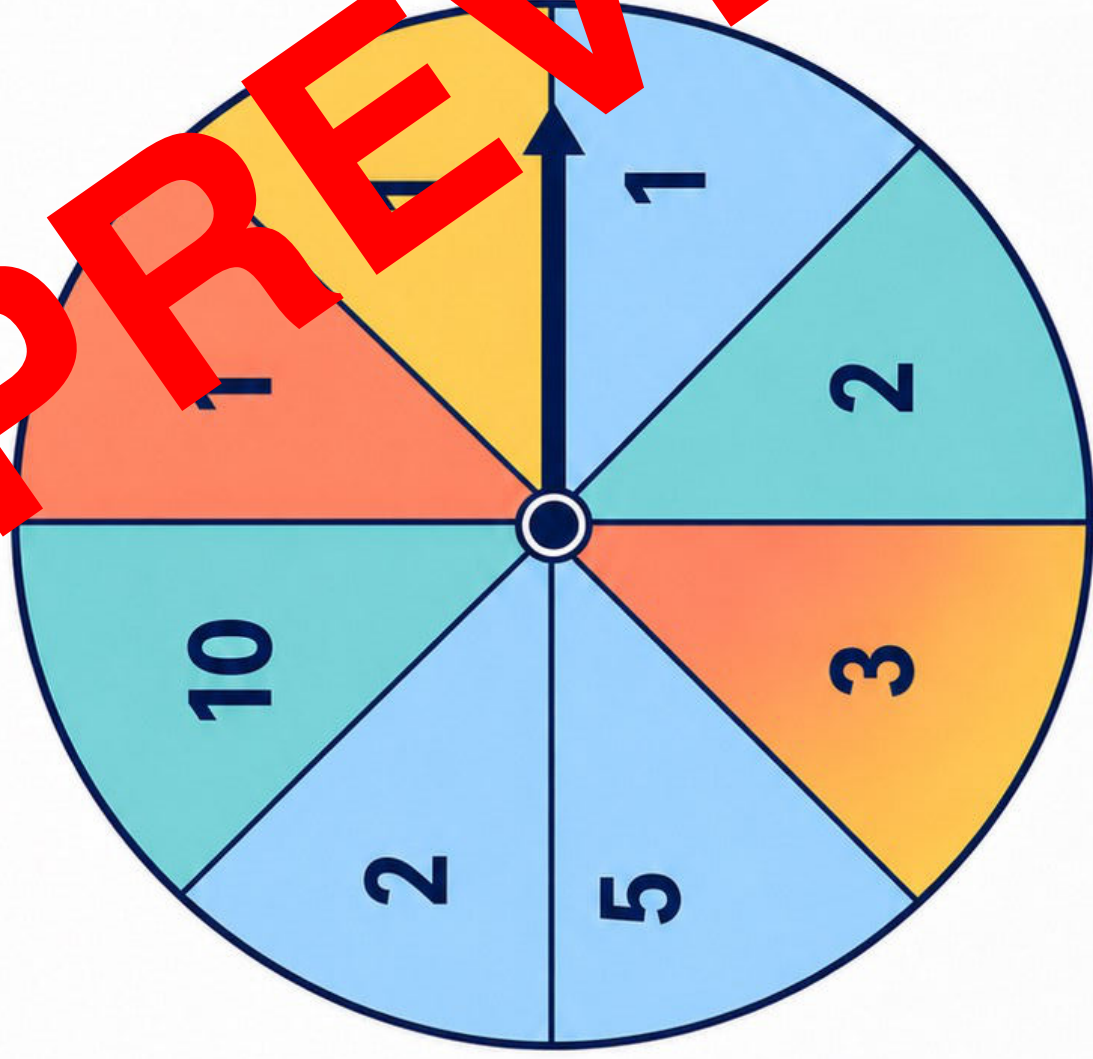
After 6 red counters
removed, what is
 $P(\text{blue})$ now?

4

With replacement,
how many greens
are expected in
100 draws?

Record one agreed answer on your score sheet.

STATION 5: WEIGHTED RANDOMISER



1 What is $P(\text{score } 1)$?

Give a fraction and percentage.

2

What is $P(\text{score } 5)$?

Is this unlikely, even chance or likely?

3

What is $P(\text{score } 10)$?

Compare it with $P(\text{score } 2)$.

4

In 10 spins, how often is each score expected? What is the maximum total score in five turns?

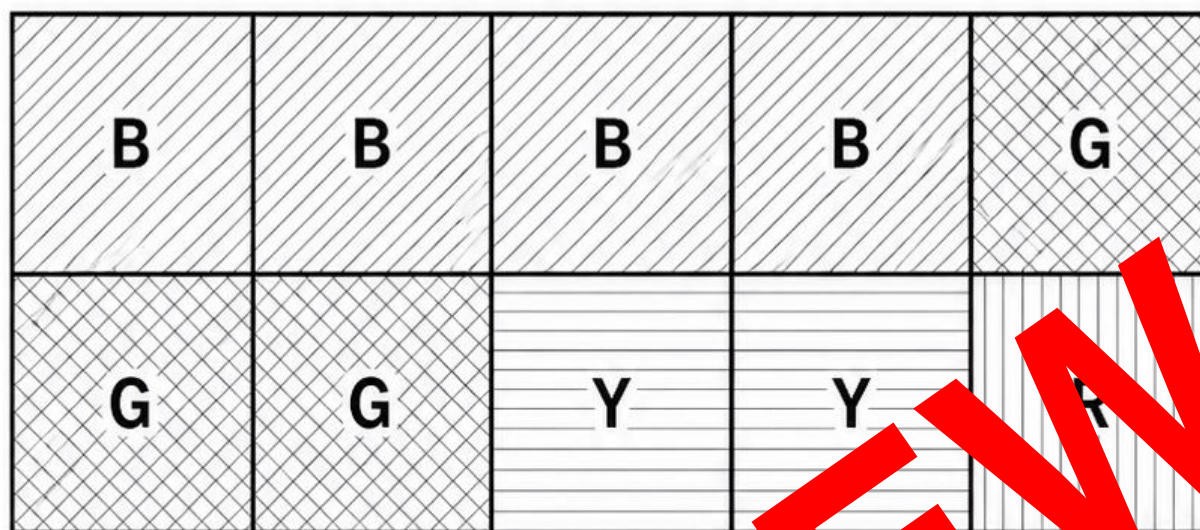
Record one agreed answer on your score sheet.

FAIRGROUND CHANCE ASSESSMENT — PART 1

Name: _____

A prize wheel has 10 equal sectors: 4 blue, 3 green, 2 yellow and 1 red.

10 EQUAL PRIZE-WHEEL SECTORS



B = blue • G = green • Y = yellow • R = red

1. Complete the table.

	Fraction	Decimal	Percentage
Blue			
Green			
Yellow			
Red			

2. Order the four colours from least likely to most likely.

3. Calculate the expected number of each colour in 200 spins.

	Expected in 200
Blue	
Green	
Yellow	
Red	

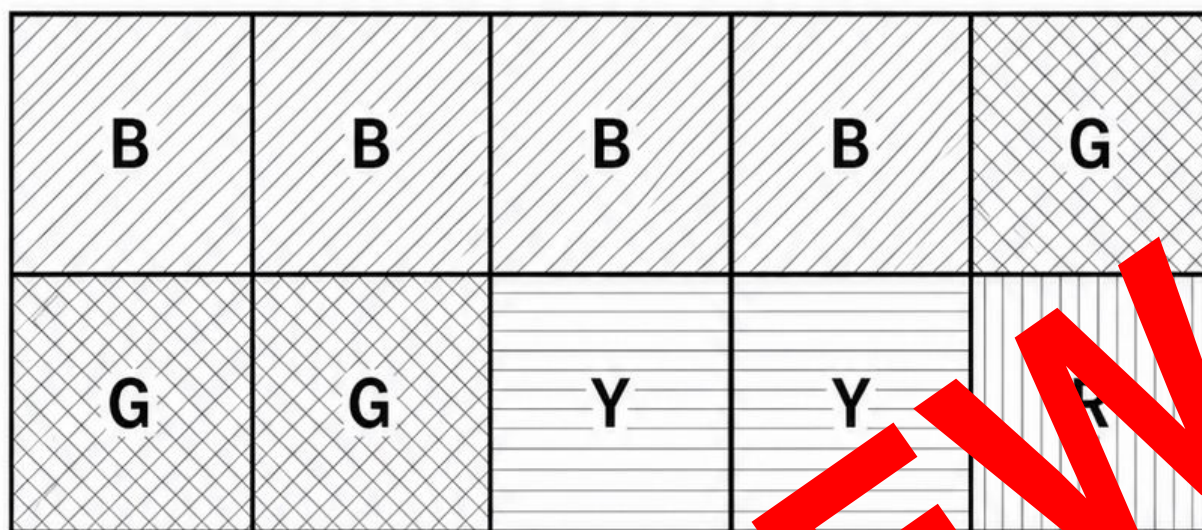
Show your calculations.

FAIRGROUND CHANCE ASSESSMENT — PART 1

Name: ANSWERS

A prize wheel has 10 equal sectors: 4 blue, 3 green, 2 yellow and 1 red.

10 EQUAL PRIZE-WHEEL SECTORS



B = blue • G = green • Y = yellow • R = red

1. Complete the table.

	Fraction	Decimal	Percentage
Blue	$\frac{2}{5}$	0.4	40%
Green	$\frac{3}{10}$	0.3	30%
Yellow	$\frac{1}{5}$	0.2	20%
Red	$\frac{1}{10}$	0.1	10%

2. Order the four colours from least likely to most likely.

Red, Yellow, Green, Blue.

3. Calculate the expected number of each colour in 200 spins.

	Expected in 200
Blue	80
Green	60
Yellow	40
Red	20

Show your calculations.

$$200 \times \frac{2}{5} = 80$$

$$200 \times \frac{3}{10} = 60$$

$$200 \times \frac{1}{5} = 40$$

$$200 \times \frac{1}{10} = 20$$

FAIRGROUND CHANCE ASSESSMENT – PART 2

Name: _____

The theoretical probabilities are blue 40%, green 30%, yellow 20% and red 10%.

Colour	Observed in 50 spins	Relative frequency	Observed in 500 spins	Relative frequency
Blue	21		198	
Green	13		151	
Yellow	11		99	
Red	5		52	

1. Calculate every relative frequency as a percentage.

2. Compare the 50-spin results with the theoretical probabilities.

3. Compare the 500-spin results with the theoretical probabilities.

4. Which trial size produced the more stable set of relative frequencies? Use evidence.



FAIRGROUND CHANCE ASSESSMENT – PART 2

Name: **ANSWERS**

The theoretical probabilities are blue 40%, green 30%, yellow 20% and red 10%.

Colour	Observed in 50 spins	Relative frequency	Observed in 500 spins	Relative frequency
Blue	21	42%	198	39.6%
Green	13	26%	151	30.2%
Yellow	11	22%	99	19.8%
Red	5	10%	52	10.4%

1. Calculate every relative frequency as a percentage.

50 spins: 42%, 26%, 22%, 10%. 500 spins: 39.6%, 30.2%, 19.8%, 10.4%

2. Compare the 50-spin results with the theoretical probabilities.

Compared with theory the 50-spin differences are +2, -4, +2 and 0 percentage points.

3. Compare the 500-spin results with the theoretical probabilities.

The 500-spin differences are -0.4, +0.2, -0.2 and +0.4 percentage points.

4. Which trial size produced the more stable set of relative frequencies? Use evidence.

The 500-spin set is more stable: every result is within 0.4 percentage points of theory, compared with up to 4 points for 50 spins.

FAIRGROUND CHANCE ASSESSMENT – PART 3

Name: _____



Prize-wheel probabilities: blue 40%, green 30%, yellow 20%, red 10%.

1. Plan a 1,000-spin digital simulation of the prize wheel. State the tool, what data to record and how to calculate relative frequencies.

2. A player says, 'After five reds in a row, blue's guaranteed next.' Evaluate the claim using probability and independence.

3. Explain why increasing the number of spins usually makes relative frequencies more stable, but does not guarantee exact theoretical results.

4. Write an evidence-based conclusion that compares theoretical probability, expected frequency and observed results for this prize wheel.

FAIRGROUND CHANCE ASSESSMENT – PART 3

Name: ANSWERS



Prize-wheel probabilities: blue 40%, green 30%, yellow 20%, red 10%.

1. Plan a 1,000-spin digital simulation of the prize wheel. State the tool, what data to record and how to calculate relative frequencies.

Use a digital spinner with probabilities 40%, 30%, 20% and 10%. Run 1,000 spins; record each colour's count; calculate $\text{count} \div 1,000$, then compare each relative frequency with theory.

2. A player says, 'After five reds in a row, blue's guaranteed next.' Evaluate the claim using probability and independence.

The claim is false. Spins are independent. After any sequence, $P(\text{blue})$ remains 40%, so blue is likely but not guaranteed.

3. Explain why performing a number of spins usually makes relative frequencies more stable, but does not guarantee exact theoretical results.

More spins reduce the influence of random variation on the overall proportion, so relative frequencies usually become more stable. Chance can still prevent an exact match.

4. Write an evidence-based conclusion that compares theoretical probability, expected frequency and observed results for this prize wheel.

Theory predicts 400 blue, 300 green, 200 yellow and 100 red in 1,000 spins. Observed counts may differ, but relative frequencies from many spins should usually be close to 40%, 30%, 20% and 10%.

PROBABILITY – YEAR 6 RUBRIC

Name: _____ Class: _____ Date: _____

CRITERIA	BEGINNING	DEVELOPING	ACHIEVING	CONFIDENT	EXCEEDING
Represent probability	Identifies simple chance words.	Shows some connections between fractions, decimals and percentages.	Uses equivalent fractions, decimals and percentages.	Converts forms accurately and explains links.	Chooses efficient forms and justifies comparisons.
Calculate expected frequency	Needs support to connect chance and count.	Calculates frequency for example with guidance.	Calculates expected frequencies accurately.	Solves multi-step expected-frequency problems.	Generalises and verifies efficient calculations.
Conduct and record simulations	Records incomplete trial data.	Runs trials with some accurate recording.	Conducts fair trials and records accurately.	Uses digital tools and relative frequencies accurately.	Designs robust simulations and checks data quality.
Compare observed with expected	States results without comparison.	Notices simple similarities or differences.	Compares observed results with expected results.	Uses numerical evidence to compare results.	Evaluates patterns across different trial sizes.
Explain variation	Recognises results can differ.	Links differences to chance.	Explains random variation in finite trials.	Explains why larger samples are more stable.	Qualifies conclusions without claiming guarantees.
Explain independence	May rely on previous outcomes.	Recognises some events reset.	Explains that trials are independent.	Rejects gambler's-fallacy reasoning with probability.	Applies independence accurately in unfamiliar contexts.

Overall achievement: _____ Teacher comment: _____

Probability

PREVIEW



What will we learn?

Represent probability as a fraction, a decimal and a percentage.

Calculate expected frequency.

Run repeated trials and record relative frequency.

Explain why observed and expected results can differ.



Probability measures likelihood

Probability measures chance from 0 to 1.

0 = impossible = 0

1 = certain = 100%

Every probability belongs somewhere between.



Chance language on the

scale

0 – impossible

about 0.5 – unlikely

0.75 – even chance

about 0.75 – likely

1 – certain



One probability, three forms

$$1/4 = 0.25 = 25\%$$

$$3/5 = 0.6 = 60\%$$

$$3/4 = 0.75 = 75\%$$

the numbers change, but the chance stays the same.



Build a sample space

Fair die $P(\text{roll above } 4)$

Favourable outcomes: 5 and 6 $\Rightarrow$ 2 outcomes

Potentially equally likely outcomes: 6

$$= \frac{2}{6} = \frac{1}{3} \approx 0.333 \approx 33.3\%$$



Complements make a whole

An event and its complement cover every outcome.

$$P(\text{event}) + P(\text{no event}) = 1$$

Example: $P(\text{rain}) = 35\%$

$$P(\text{no rain}) = 65\%$$



Expected frequency

expected frequency = probability $\times$ number of trials

It predicts what should be an experiment.

It is an expectation, not a guarantee.



120 fair die rolls

For any face of a fair die

$$p(\text{face}) = 1/6$$

$$120 \times 1/6 = 20$$

We expect each face about 20 times, not exactly 20.



Relative frequency

relative frequency = $\frac{\text{observed frequency}}{\text{total trials}}$

Example: 23 heads in 40 tosses

$$\frac{23}{40} = 0.575 = 57.5\%$$



Expected and observed

Fair-coin theory: 50% heads

Observed: 13 heads in 40 tosses = 32.5%

Difference: 17.5 percentage points

Chance variation explains the gap.



Variation in small samples

Small samples can look weird.

A fair process may still produce streaks or clusters.

Variation does not automatically mean the process is unfair.



More trials, more stability

As trials increase, random fluctuations have less influence on the overall proportion.

Relative frequency gradually becomes more stable and tends to move closer to theory.



Independence and streaks

Five tails in a row does not make heads 'due'.

For a fair coin, each toss is independent.

$p(\text{heads on the next toss}) = 1/2 = 50\%$.



Two-dice sums

Two dice have 36 ordered outcomes.

Sum 7: 6 combinations

Sum 12: 1 combination

Sum 1: 1 combination

Therefore, 7 is more likely than 2 or 12.



Digital simulations

A digital spinner or dice simulator can run hundreds of trials

quickly

Record every outcome count.

Divide by the total trials to find relative frequency.



Compare trial sizes

Suppose sum 7 occurs

$$12/100 = 12\%$$

$$7/500 = 1.4\%$$

$$169/1000 = 16.9\%$$

Theory is 16.7%, the larger samples are more stable here.



Plan an experiment

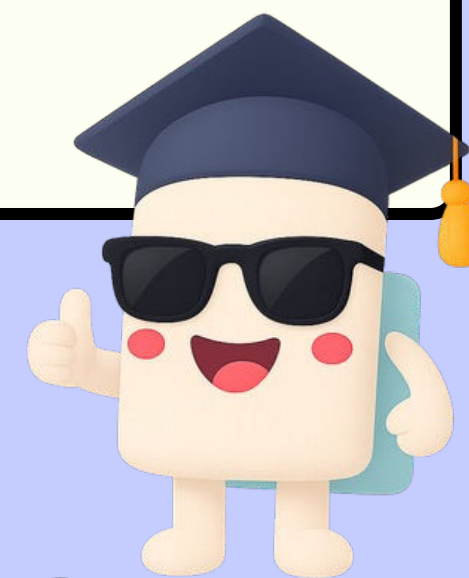
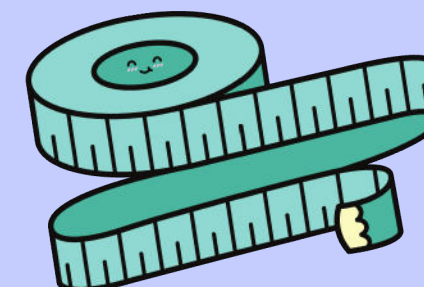
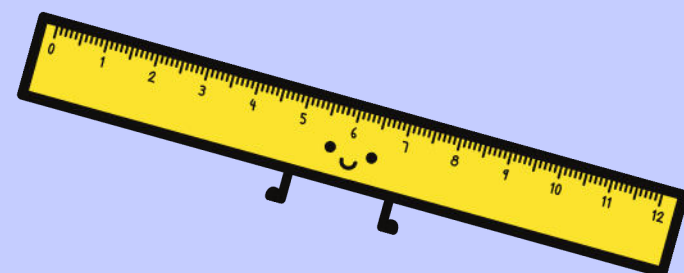
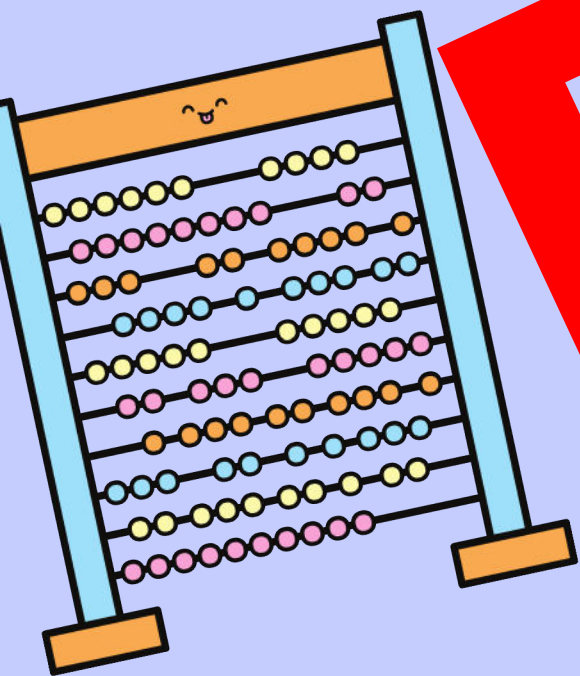
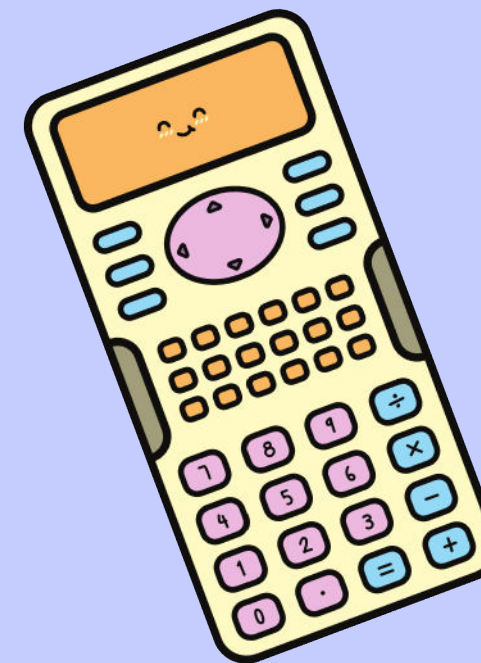
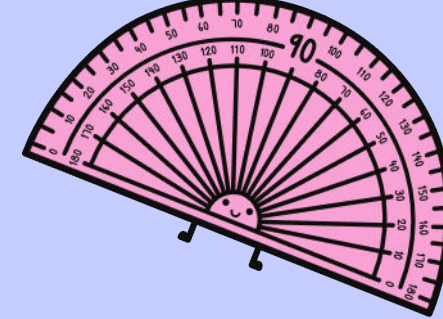
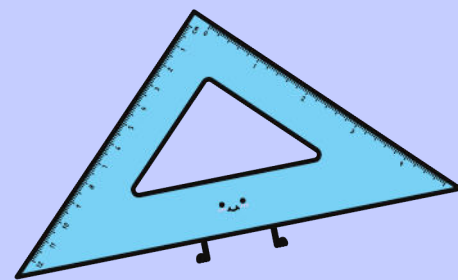
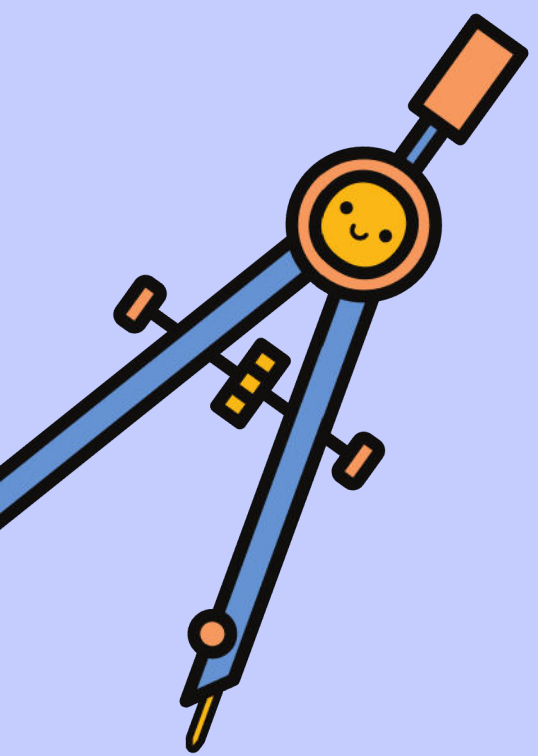
1. Define the scope of the experiment.
2. Calculate the theoretical probabilities.
3. Choose enough trials.
4. Record outcomes accurately.
5. Compare observed and expected results.



Review your reasoning

1. Convert $\frac{3}{5}$ to a decimal and percentage.
2. Find the expected score in 12 die rolls.
3. Why are 50 trials usually more stable than 20?
After five trials, what is $P(\text{heads next})$?





Well Done!

PREVIEW

Probability Quiz

PREVIEW



Question 1

What is $P(\text{rolling a 3 on a six-sided die})$?

A. $1/6$

B. $1/3$

C. $1/2$

D. $5/6$



Answer 1

B. $\frac{1}{6}$

There is one favorable face out of six equally likely faces.



Question 2

True or false?

0.75, $\frac{3}{4}$ and 75% represent the same probability.

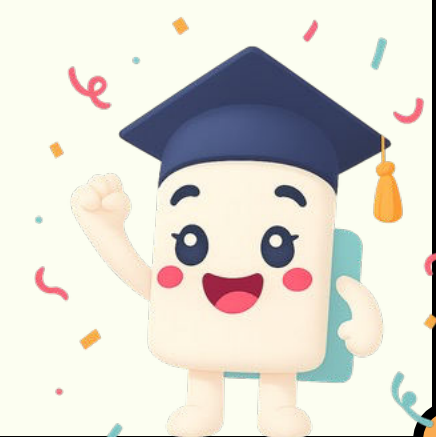


Answer 2

PREVIEW

1.2.

$$0.75 = 3/4 = 75\%.$$



Question 3

A bag has 3 blue and 7 yellow counters.

Give (one) as a fraction, decimal and percentage.



Answer 3

PREVIEW

$$r = 0.60\%$$



Question 4

If $P(\text{rain}) = 35\%$, what is $P(\text{no rain})$?

- A. 35%
- B. 50%
- C. 65%
- D. 75%



Answer 4

PREVIEW

C. 59

$$100\% - 35\% = 65\%.$$



Question 5

True or false?

After four tosses in which heads is more likely on the next fair toss.



Answer 5

The new coin toss remains independent, so $P(\text{heads}) = 1/2$.



Question 6

How many successes are expected in 120 fair die rolls?

PREVIEW



Answer 6

$$120 \times 6 = 20$$

We expect about 20 sixes.



Question 7

Which result is closest to expected 50:50 split.

- A. 80H/20T in 10
- B. 50H/49T in 1,000
- C. 50H/6T in 20
- D. 75H/25T in 100



Answer 7

PREVIEW

$\approx 506H/4 = 126.5H$ in 1,000 trials

It is 49.6% heads and 49.4% tails.



Question 8

True or false?
The probabilities of all possible outcomes in a complete chance
experiment add to 1.



Answer 8

A complete set of outcomes represents 100% of the chance.



Question 9

Which total is most likely with two fair six-sided dice?

A. 2

B. 4

C. 7

D. 12



Answer q

Six numbers make 7, more than any other total.



Question 10

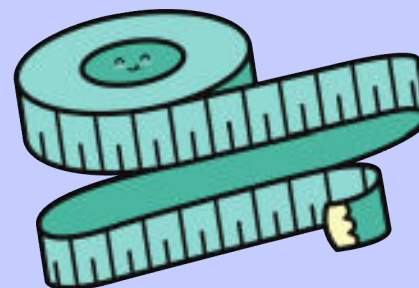
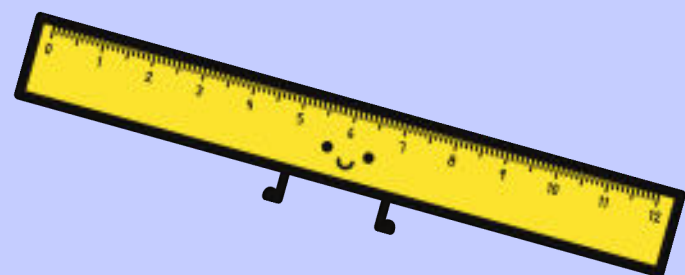
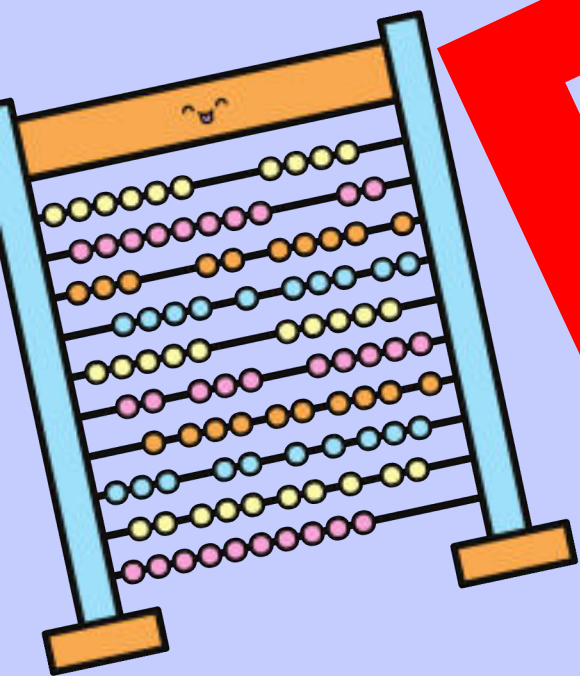
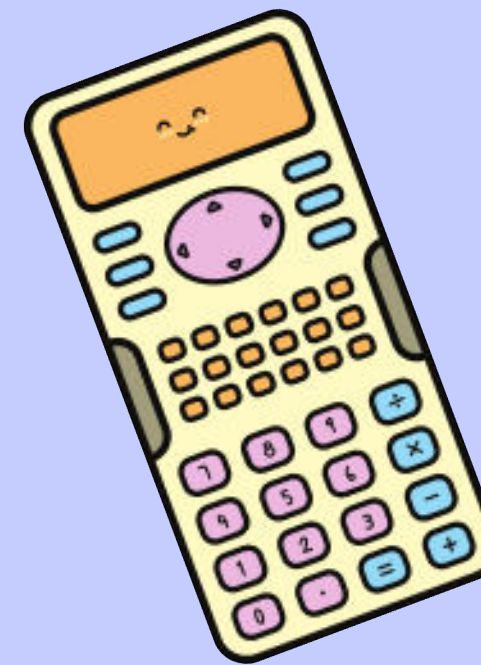
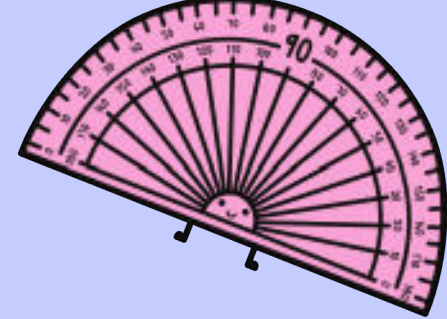
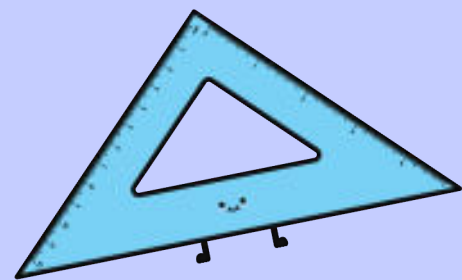
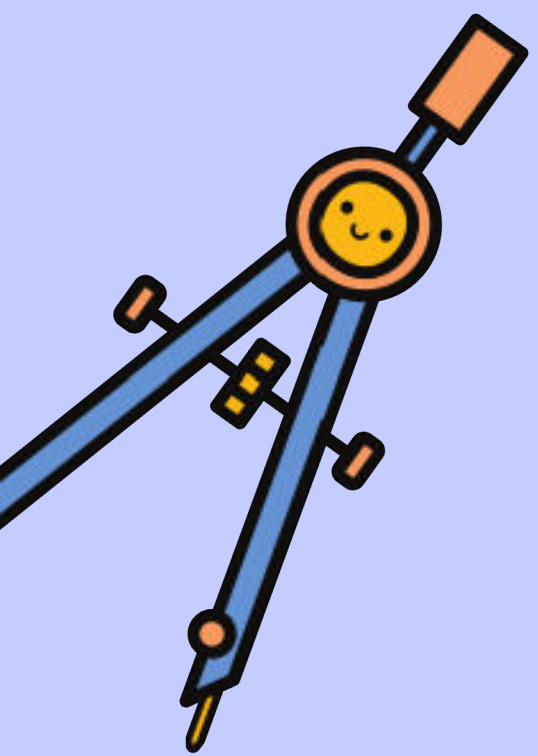
Why do larger numbers of trials usually produce more stable relative frequencies?



Answer 10

Random variation has less influence on the overall proportion, so results tend to move closer to theoretical probability.





Well Done!

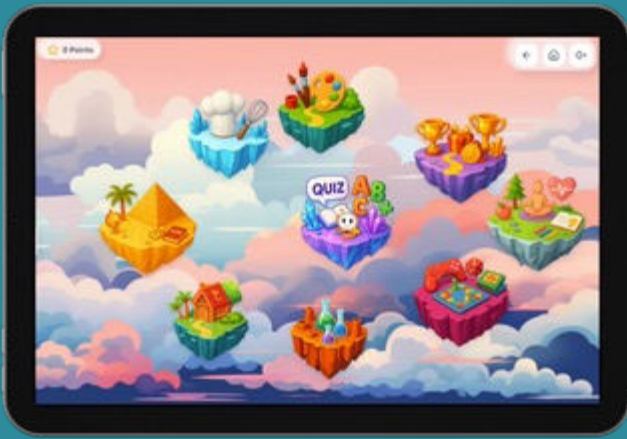
PREVIEW

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Year 6 Probability Unit

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PROBABILITY TOOLKIT

Probability = favourable outcomes ÷ total equally likely outcomes



Equivalent forms

$$\frac{3}{4} = 0.75 = 75\%$$

Theoretical probability



What we expect before an experiment.

Experimental probability



**successes ÷
number of trials**

More trials usually bring experimental results closer to theoretical probability.

Example: rolling an even number on a fair die



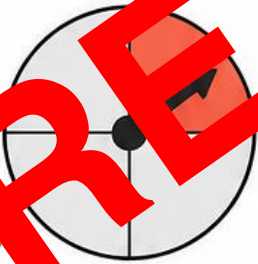
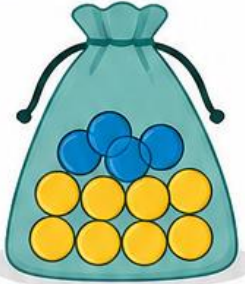
$$\frac{3}{6} = \frac{1}{2} = 0.5 = 50\%$$

CHANCE MATCH-UP

Rules and scenario cards

1. Cut out both card sets.
2. Shuffle each set separately and place them face down.
3. Turn over one scenario card and one representation card.
4. Keep the pair if they show the same probability. Explain your reasoning.
5. The first player to collect six pairs wins.

PREVIEW

A Roll an even number on a fair six-sided die. 	B Choose a vowel from the letters A, E, I, O, U. 
C Spin red on a spinner with four equal sections and one red section. 	D Choose blue from a bag with 3 blue and 7 yellow counters. 
E Roll a number greater than 4 on a fair six-sided die. 	F Draw an ace from a standard 52-card deck. 
G Roll a 6 on a fair six-sided die. 	H Choose green from a bag containing only purple counters. 

CHANCE MATCH-UP

Representation cards



$$\frac{1}{2} = 0.5 = 50\%$$

EVEN CHANCE



$$1 = 100\%$$

CERTAIN



$$\frac{1}{4} = 0.25 = 25\%$$

UNLIKELY



$$\frac{3}{10} = 0.3 = 30\%$$

UNLIKELY



$$\frac{1}{3} = 0.333... \approx 33.3\%$$

UNLIKELY



$$\frac{1}{13} \approx 0.077 \approx 7.7\%$$

VERY UNLIKELY



$$\frac{1}{6} \approx 0.167 \approx 16.7\%$$

UNLIKELY



$$0 = 0\%$$

IMPOSSIBLE

PREVIEW

PROBABILITY LAB STATIONS

Work in groups. Complete 30 trials at each station. Record your results, calculate experimental probability, then compare it with theoretical probability.

AT EACH STATION

- 1 Predict the theoretical probability.
- 2 Complete 30 fair trials.
- 3 Tally each success.
- 4 Calculate successes $\div$ 30.
- 5 Compare your result with the theoretical probability.

STATION 1: COIN TOSS



Event: heads

STATION 2: SIX-SIDED DIE



Event: a number greater than 4

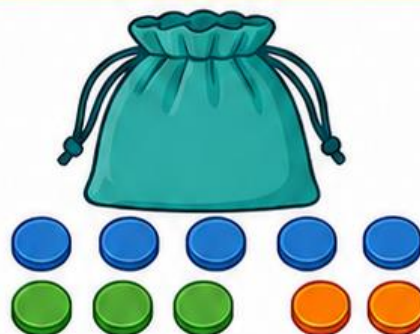
STATION 3: FOUR-COLOUR SPINNER



Sections: red, red, blue, yellow

Event: red

STATION 4: MYSTERY BAG



Contents: 5 blue, 3 green, 2 orange counters

Event: green

Return the counter after every draw.

PROBABILITY LAB STATIONS

Station cards



STATION 1: COIN TOSS



Equipment: 1 coin



Event: heads

30

Complete 30 tosses.

STATION 2: SIX-SIDED DIE



Equipment: 1 fair die

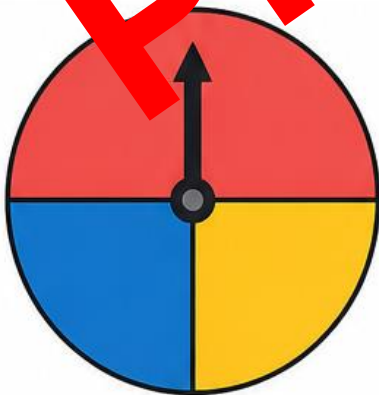


Event: a number greater than 4

30

Complete 30 rolls.

STATION 3: FOUR-COLOUR SPINNER



Sections: red, red, blue, yellow

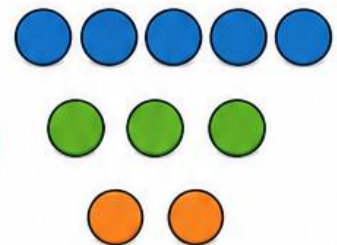


Event: red

30

Complete 30 spins.

STATION 4: MYSTERY BAG



Contents: 5 blue, 3 green, 2 orange counters



Event: green

30

Complete 30 draws.



Return the counter after every draw.

PROBABILITY LAB STATIONS

Recording mat

Name: _____



Before you begin: Which station do you predict will have the greatest experimental variation? Explain.

Station	Theoretical probability	Successes out of 30	Experimental probability	Difference
1. Coin toss				
2. Six-sided die				
3. Four-colour spinner				
4. Mystery bag				



1. Which experimental result was closest to its theoretical probability? Use evidence.

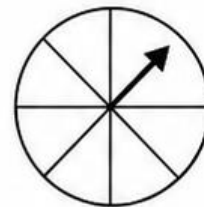


2. Why might another group get different results even when the equipment is fair?

REPRESENTING PROBABILITY

Page 1: Fractions

Name: _____



For each event, write favourable outcomes over total equally likely outcomes. Simplify the fraction.

1. Roll a 5 on a fair six-sided die.



Probability: _____

2. Roll a number greater than 4 on a fair six-sided die.



Probability: _____

3. Spin blue on a spinner with 8 equal sections, including 3 blue sections.



Probability: _____

4. Choose red from a bag with 4 red and 6 black counters.



Probability: _____

5. Draw a heart from a standard 52-card deck.

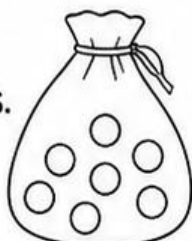


Probability: _____

6. Choose a vowel from the letters in PROBABILITY.

Probability: _____

7. Choose green from a bag containing 9 orange counters.



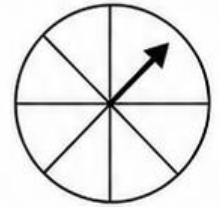
Probability: _____

8. Choose a whole number from 1 to 10 that is less than 11.

Probability: _____

REPRESENTING PROBABILITY

Page 1: Fractions



ANSWERS

For each event, write favourable outcomes over total equally likely outcomes. Simplify the fraction.

1. Roll a 5 on a fair six-sided die.



Probability: $\frac{1}{6}$

2. Roll a number greater than 4 on a fair six-sided die.



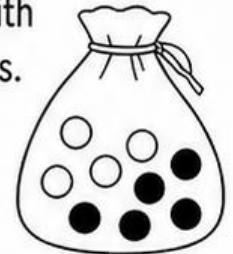
Probability: $\frac{2}{6} = \frac{1}{3}$

3. Spin blue on a spinner with 8 equal sections, including 3 blue sections.



Probability: $\frac{3}{8}$

4. Choose red from a bag with 4 red and 6 black counters.



Probability: $\frac{4}{10} = \frac{2}{5}$

5. Draw a heart from a standard 52-card deck.

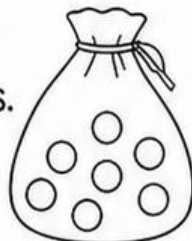


Probability: $\frac{13}{52} = \frac{1}{4}$

6. Choose a vowel from the letters in PROBABILITY.

Probability: $\frac{4}{11}$

7. Choose green from a bag containing 9 orange counters.



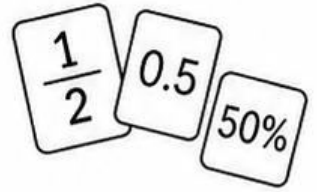
Probability: $\frac{0}{9} = 0$

8. Choose a whole number from 1 to 10 that is less than 11.

Probability: $\frac{10}{10} = 1$

REPRESENTING PROBABILITY

Page 2: Equivalent forms



Name: _____

Complete each row. Simplify fractions.

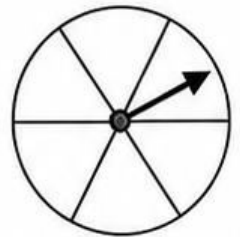
Given	Fraction	Decimal	Percentage
1. $\frac{1}{2}$			
2. $\frac{3}{4}$			
3. $\frac{2}{5}$			
4. 0.65			
5. 35%			
6. 12.5%			

7. Order from least to greatest: 0.6, $\frac{3}{4}$, 55%, $\frac{2}{3}$



Answer: _____

8. A spinner lands on blue 18 times in 40 spins. Write the experimental probability in all three forms.



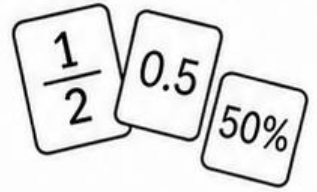
Fraction: _____

Decimal: _____

Percentage: _____

REPRESENTING PROBABILITY

Page 2: Equivalent forms



ANSWERS

Complete each row. Simplify fractions.

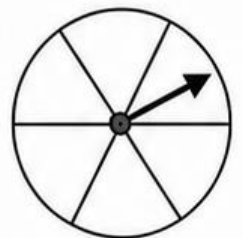
Given	Fraction	Decimal	Percentage
1. $\frac{1}{2}$	$\frac{1}{2}$	0.5	50%
2. $\frac{3}{4}$	$\frac{3}{4}$	0.75	75%
3. $\frac{2}{5}$	$\frac{2}{5}$	0.4	40%
4. 0.65	$\frac{13}{20}$	0.65	65%
5. 35%	$\frac{7}{20}$	0.35	35%
6. 12.5%	$\frac{1}{8}$	0.125	12.5%

7. Order from least to greatest: 0.6, $\frac{3}{4}$, 55%, $\frac{2}{3}$



Answer: 55%, 0.6, $\frac{2}{3}$, $\frac{3}{4}$

8. A spinner lands on blue 18 times in 40 spins. Write the experimental probability in all three forms.



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

Decimal: 0.45

Percentage: 45%

TWO-DICE OUTCOMES

Page 1: Build the sample space



Name: _____

Add the two dice. Complete all 36 sums in the sample-space table.

Die 2 \ Die 1	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

PREVIEW

1. Which sum occurs most often? _____
2. Which sums occur least often? _____
3. How many combinations produce a sum of 8? _____
4. How many equally likely outcomes are in the sample space? _____

TWO-DICE OUTCOMES

Page 1: Build the sample space



ANSWERS

Add the two dice. Complete all 36 sums in the sample-space table.

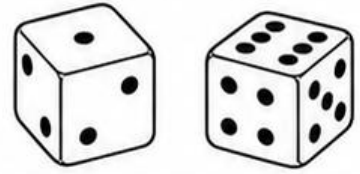
Die 2 \ Die 1	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

1. Which sum occurs most often? 7
2. Which sums occur least often? 2 and 12
3. How many combinations produce a sum of 8? 5
4. How many equally likely outcomes are in the sample space? 36

TWO-DICE OUTCOMES

Page 2: From outcomes to probability

Name: _____



2nd die	1	2	3	4	5	6	
1st die	1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
	2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
	3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
	4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
	5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
	6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

A pair of fair six-sided dice has 36 equally likely ordered outcomes.

1. Find $P(\text{sum} = 7)$. Write a fraction, decimal and percentage.

Answer: _____

2. Find $P(\text{sum} = 12)$. Write a fraction, decimal and percentage.

Answer: _____

3. Find $P(\text{sum} > 9)$. Simplify the fraction.

Answer: _____

4. Find $P(\text{doubles})$. Simplify the fraction.

Answer: _____

5. Find $P(\text{sum is not 7})$. Simplify the fraction.

Answer: _____

6. Compare $P(\text{sum} = 5)$ and $P(\text{sum} = 9)$. What do you notice?

Answer: _____

7. Order these events from least to greatest probability: sum = 2, sum = 6, sum = 7, sum = 10.

Answer: _____

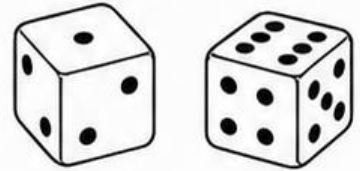
8. Explain why a sum of 7 is more likely than a sum of 2.

Answer: _____

TWO-DICE OUTCOMES

Page 2: From outcomes to probability

ANSWERS



2nd die		1	2	3	4	5	6
1st die	1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
	2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
	3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
	4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
	5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
	6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

A pair of fair six-sided dice has 36 equally likely ordered outcomes.

1. Find $P(\text{sum} = 7)$. Write a fraction, decimal and percentage.

Answer: $6/36 = 1/6 \approx 0.167 \approx 16.7\%$

2. Find $P(\text{sum} = 2)$. Write a fraction, decimal and percentage.

Answer: $1/36 \approx 0.028 \approx 2.8\%$

3. Find $P(\text{sum} > 9)$. Simplify the fraction.

Answer: $6/36 = 1/6$

4. Find $P(\text{doubles})$. Simplify the fraction.

Answer: $6/36 = 1/6$

5. Find $P(\text{sum is not 7})$. Simplify the fraction.

Answer: $30/36 = 5/6$

6. Compare $P(\text{sum} = 5)$ and $P(\text{sum} = 9)$. What do you notice?

Both are $4/36 = 1/9$,
Answer: so they are equally likely.

7. Order these events from least to greatest probability: sum = 2, sum = 6, sum = 7, sum = 10.

Answer: sum 2, sum 10, sum 6, sum 7

8. Explain why a sum of 7 is more likely than a sum of 2.

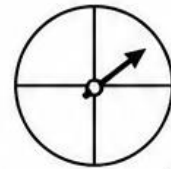
Six ordered outcomes total 7;
Answer: only (1,1) totals 2.

EXPERIMENTAL PROBABILITY

Name: _____



Experimental probability = successes ÷ number of trials



Experiment	Theoretical probability	Trials	Successes	Experimental fraction	Decimal	Percentage
Red on a four-equal-section spinner	$\frac{1}{4}$	20	7			
Heads on a fair coin	$\frac{1}{2}$	40	18			
Blue from a bag with 4 blue and 6 yellow counters, with replacement	$\frac{2}{5}$	50	23			

1. Which experimental result is closest to theoretical probability? Show the difference.

Answer: _____

2. Why do fair experiments not always match theoretical probability exactly?

Answer: _____

3. If the spinner experiment used 200 trials, what would you expect to happen to the difference? Explain.

Answer: _____

4. Another group recorded 22 heads in 40 tosses. Combine both coin groups. Write the probability as a fraction and percentage.

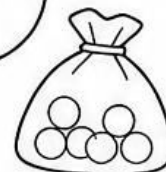
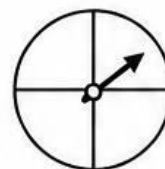
Answer: _____

EXPERIMENTAL PROBABILITY

ANSWERS



Experimental probability = successes ÷ number of trials



Experiment	Theoretical probability	Trials	Successes	Experimental fraction	Decimal	Percentage
Red on a four-equal-section spinner	$\frac{1}{4}$	20	7	$\frac{7}{20}$	0.35	35%
Heads on a fair coin	$\frac{1}{2}$	40	18	$\frac{18}{40} = \frac{9}{20}$	0.45	45%
Blue from a bag with 4 blue and 6 yellow counters, with replacement	$\frac{2}{5}$	50	23	$\frac{23}{50}$	0.46	46%

1. Which experimental result is closest to the theoretical probability? Show the difference.

Coin toss; 45% is 5 percentage points below 50%.

2. Why do fair experiments not always match theoretical probability exactly?

Random variation means a finite sample may differ from the expected result.

3. If the spinner experiment used 200 trials, what would you expect to happen to the difference? Explain.

The difference would usually become smaller because more trials reduce random variation.

4. Another group recorded 22 heads in 40 tosses. Combine both coin groups. Write the probability as a fraction and percentage.

$40/80 = 1/2 = 50\%$.

SCALING SAMPLES



Name: _____

Use the sample proportion to estimate the larger population.



Worked example: 4 out of 10 = 40%, so 40% of 200 = 80.

1. In a sample, 12 of 30 seedlings germinated. Estimate how many would germinate out of 450.



Answer: _____

2. Seven of 20 surveyed students ride a bicycle to school. Estimate how many would ride out of 600.



Answer: _____

3. A sample contains 9 blue counters out of 25. Estimate the number of blue counters in a population of 500.



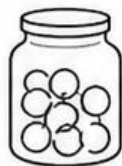
Answer: _____

4. Fourteen of 40 library loans were graphic novels. Estimate the number out of 320 loans.



Answer: _____

5. A sample of 60 beads contains 18 red beads. Estimate the number of red beads in a population of 500.



Answer: _____

6. Two samples estimate the same result: 40% from 30 trials and 37% from 300 trials. Which estimate would you trust more? Explain.

Answer: _____

SCALING SAMPLES



ANSWERS

Use the sample proportion to estimate the larger population.



Worked example: 4 out of 10 = 40%, so 40% of 200 = 80.

1. In a sample, 12 of 30 seedlings germinated. Estimate how many would germinate out of 450.



Answer: $12/30 \times 450 = 180$

2. Seven of 20 surveyed students ride a bicycle to school. Estimate how many would ride out of 600.



Answer: $7/20 \times 600 = 210$

3. A sample contains 9 blue counters out of 25. Estimate the number of blue counters in a population of 1000.



Answer: $9/25 \times 1000 = 360$

4. Fourteen of 40 library loans were graphic novels. Estimate the number out of 320 loans.



Answer: $14/40 \times 320 = 112$

5. A sample of 60 beads contains 18 red beads. Estimate the number of red beads in a population of 500.



Answer: $18/60 \times 500 = 150$

6. Two samples estimate the same result: 40% from 30 trials and 37% from 300 trials. Which estimate would you trust more? Explain.

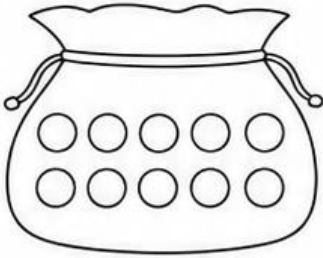
Answer: Trust 37% from 300 trials. The larger sample reduces random variation.

MULTI-STEP PROBABILITY

Name: _____

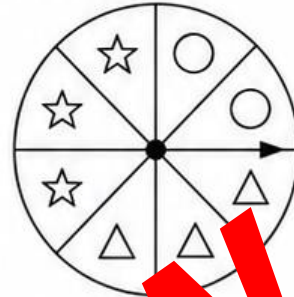
Show your reasoning. Simplify fractions and give equivalent forms when requested.

1. A bag has 5 red, 3 blue and 2 green counters. Find $P(\text{not green})$ as a fraction, decimal and percentage.



Answer: _____

2. A spinner has 8 equal sections: 3 stars, 2 circles and 3 triangles. Find $P(\text{star or circle})$.



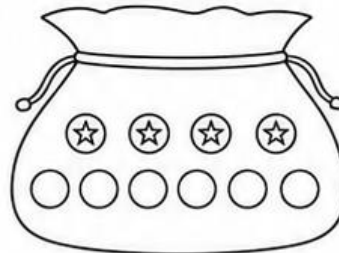
Answer: _____

3. Number cards 1 to 12 are shuffled. Find $P(\text{multiple of 3 or multiple of 4})$. Count overlaps only once.



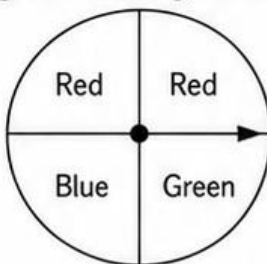
Answer: _____

4. A bag has 4 gold and 6 silver tokens. One gold token is drawn and not replaced. Find $P(\text{gold on the next draw})$.



Answer: _____

5. A fair spinner has 4 equal sections: 2 red, 1 blue and 1 green. Player A wins on red. Player B wins on blue or green. Is the game fair? Justify.



Answer: _____

6. Design a bag of 10 counters where $P(\text{blue}) = \frac{3}{5}$. State the number of blue and non-blue counters.



Answer: _____

MULTI-STEP PROBABILITY

ANSWERS

Show your reasoning. Simplify fractions and give equivalent forms when requested.

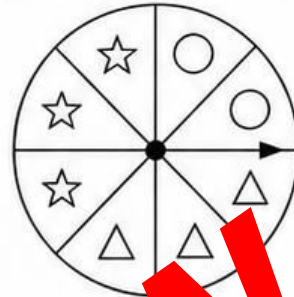
1. A bag has 5 red, 3 blue and 2 green counters. Find $P(\text{not green})$ as a fraction, decimal and percentage.



$$\frac{8}{10} = \frac{4}{5} = 0.8 = 80\%$$

Answer: _____

2. A spinner has 8 equal sections: 3 stars, 2 circles and 3 triangles. Find $P(\text{star or circle})$.



$$\frac{5}{8} = 0.625 = 62.5\%$$

Answer: _____

3. Number cards 1 to 12 are shuffled. Find $P(\text{multiple of 3 or multiple of 4})$. Count overlaps only once.



$$\{3, 4, 6, 8, 9, 12\}: \frac{6}{12} = \frac{1}{2}$$

Answer: _____

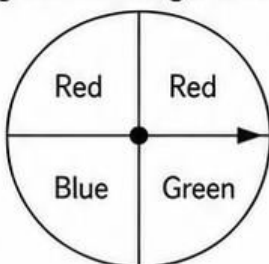
4. A bag has 4 gold and 5 silver tokens. One gold token is drawn and not replaced. Find $P(\text{gold on the next draw})$.



$$3 \text{ gold remain out of } 9: \frac{3}{9} = \frac{1}{3}$$

Answer: _____

5. A fair spinner has 4 equal sections: 2 red, 1 blue and 1 green. Player A wins on red. Player B wins on blue or green. Is the game fair? Justify.



$$\text{Yes. A: } \frac{2}{4} = \frac{1}{2}. \text{ B: } \frac{2}{4} = \frac{1}{2}.$$

Answer: _____

6. Design a bag of 10 counters where $P(\text{blue}) = \frac{3}{5}$. State the number of blue and non-blue counters.



6 blue counters and 4 non-blue counters.

Answer: _____

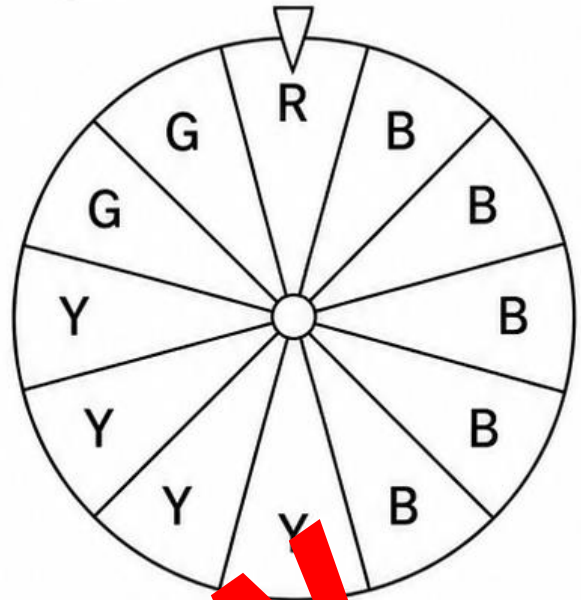
CARNIVAL CHANCE INVESTIGATION

Assessment - Page 1

Name: _____

A prize wheel has 12 equal sections:
5 blue, 4 yellow, 2 green and 1 red.

Key: B = blue, Y = yellow, G = green, R = red



1. Calculate the theoretical probability of each colour as a simplified fraction.

Blue: _____ Yellow: _____ Green: _____ Red: _____

2. Write $P(\text{blue})$ as a fraction, decimal and percentage.

Answer: _____

3. Order the four colours from least to greatest theoretical probability.

Answer: _____

RESULTS FROM 60 SPINS

Colour	Blue	Yellow	Green	Red
Frequency	28	18	10	4

4. Calculate the experimental probability of each colour as a percentage.

Blue: _____ Yellow: _____ Green: _____ Red: _____

5. Compare the theoretical and experimental results for blue. Show the difference in spins.

Answer: _____

6. Which colour had the greatest absolute difference from its theoretical expectation? Justify.

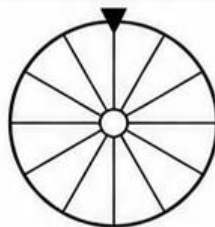
Answer: _____

CARNIVAL CHANCE INVESTIGATION

Assessment - Page 2

Name: _____

Wheel: 5 blue, 4 yellow, 2 green and 1 red section; 12 equal sections in total.



7. A player wins when the wheel lands on green or red. Is the winning probability less than, equal to or greater than $\frac{1}{4}$? Show your calculation.

Answer: _____

8. The organiser says 60 spins reveal the exact true probability of every colour. Evaluate this claim.

Answer: _____

9. Predict the number of each colour in 240 spins using theoretical probability.

Blue: _____ Yellow: _____ Green: _____ Red: _____

10. Design a fair rule for two players using the four colours. A replay is allowed. Prove that both players have the same chance.

Answer: _____

11. Change exactly one wheel section to make winning on green or red more likely than $\frac{1}{4}$. Describe the change and new probability.

Answer: _____

12. Explain why a larger number of spins usually gives a more reliable comparison with theoretical probability.

Answer: _____

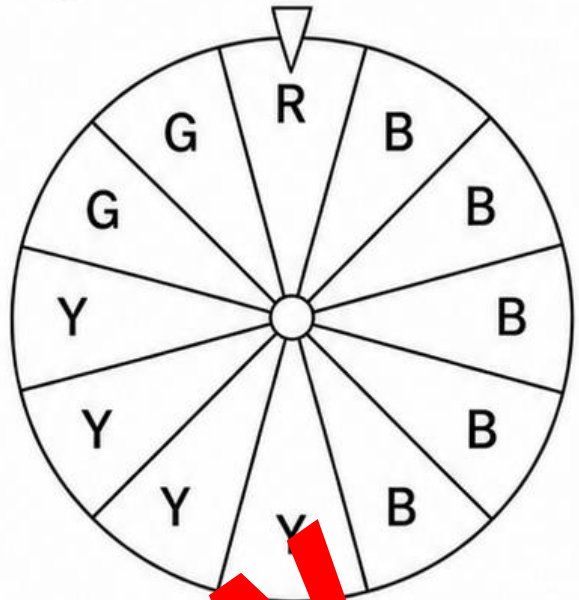
CARNIVAL CHANCE INVESTIGATION

Assessment - Page 1

ANSWERS

A prize wheel has 12 equal sections:
5 blue, 4 yellow, 2 green and 1 red.

Key: B = blue, Y = yellow, G = green, R = red



1. Calculate the theoretical probability of each colour as a simplified fraction.

Blue: $\frac{5}{12}$ Yellow: $\frac{4}{12} = \frac{1}{3}$ Green: $\frac{2}{12} = \frac{1}{6}$ Red: $\frac{1}{12}$

2. Write P(blue) as a fraction, decimal and percentage.

Answer: $\frac{5}{12} \approx 0.417 \approx 41.7\%$

3. Order the four colours from most to greatest theoretical probability.

Answer: red, green, yellow, blue

RESULTS FROM 60 SPINS

Colour	Blue	Yellow	Green	Red
Frequency	28	18	10	4

4. Calculate the experimental probability of each colour as a percentage.

Blue: 46.7% Yellow: 30% Green: 16.7% Red: 6.7%

5. Compare the theoretical and experimental results for blue. Show the difference in spins.

Answer: Expected blue = 25 spins; observed = 28; difference = 3 spins.

6. Which colour had the greatest absolute difference from its theoretical expectation? Justify.

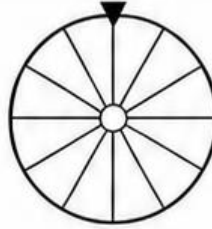
Answer: Blue. Its absolute difference is 3 spins, the greatest.

CARNIVAL CHANCE INVESTIGATION

Assessment - Page 2

ANSWERS

Wheel: 5 blue, 4 yellow, 2 green and 1 red section; 12 equal sections in total.



7. A player wins when the wheel lands on green or red. Is the winning probability less than, equal to or greater than $\frac{1}{4}$? Show your calculation.

Answer: $\frac{3}{12} = \frac{1}{4}$, so it is equal to $\frac{1}{4}$.

8. The organiser says 60 spins reveal the exact theoretical probability of every colour. Evaluate this claim.

Answer: The claim is false. Experimental results vary; 60 spins do not reveal exact probabilities.

9. Predict the number of each colour after 240 spins using theoretical probability.

Blue: 100 Yellow: 80 Green: 40 Red: 20

10. Design a fair rule for two players using the four colours. A replay is allowed. Prove that both players have the same chance.

Answer: Player A wins on blue: $\frac{5}{12}$. Player B wins on yellow or red: $\frac{5}{12}$. Green is a replay.

11. Change exactly one wheel section to make winning on green or red more likely than $\frac{1}{4}$. Describe the change and new probability.

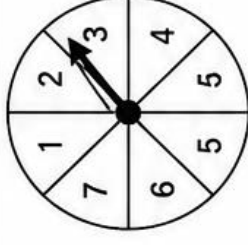
Answer: Change one yellow section to green. Then $P(\text{green or red}) = \frac{4}{12} = \frac{1}{3}$, which is greater than $\frac{1}{4}$.

12. Explain why a larger number of spins usually gives a more reliable comparison with theoretical probability.

Answer: More spins reduce random variation, so experimental proportions usually move closer to theoretical probability.



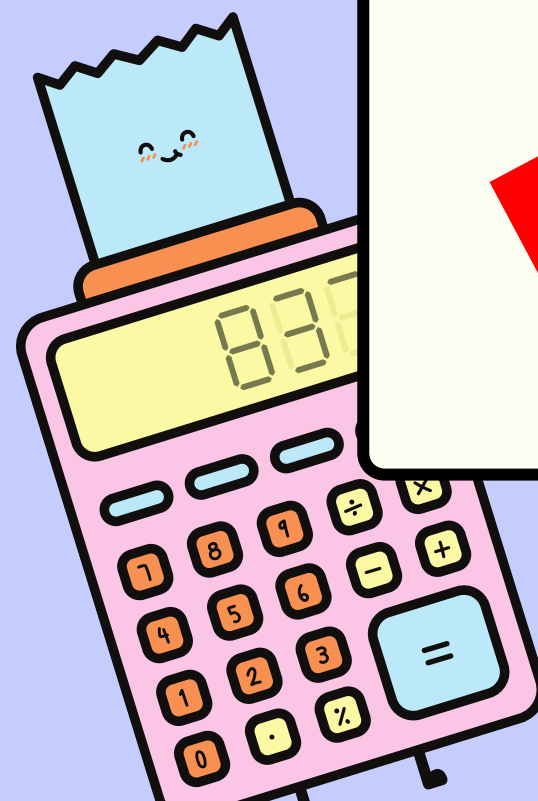
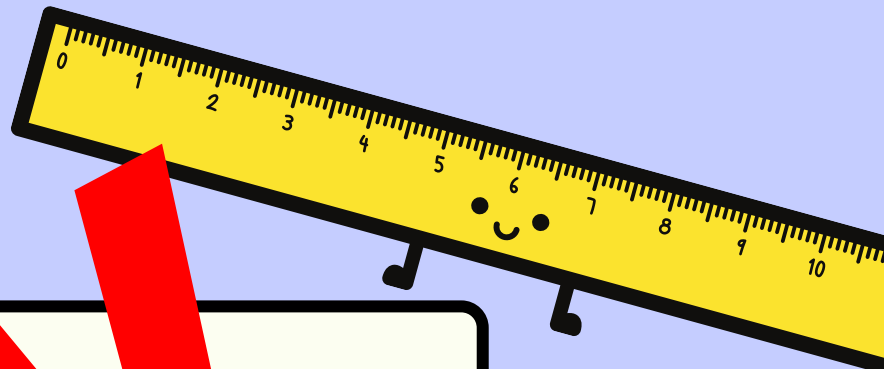
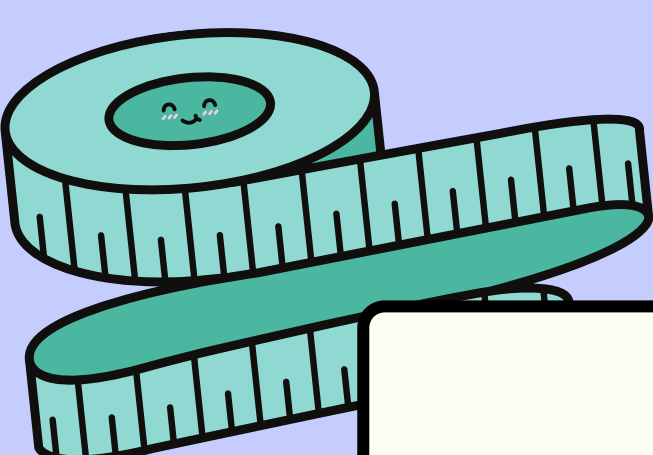
YEAR 6 PROBABILITY UNIT RUBRIC



Name: _____

Date: _____

Criteria	BEGINNING	DEVELOPING	ACHIEVING	CONFIDENT	EXCEEDING
Calculating probability	Needs support to identify outcomes and calculate simple probabilities.	Calculates some simple probabilities with probabilities.	Accurately calculates and simplifies probabilities for equally likely outcomes.	Calculates multi-step probabilities and checks reasonableness.	Applies probability flexibly to unfamiliar and complex situations.
Representing and comparing	Needs support to connect fractions, decimals and percentages.	Converts common forms with some accuracy.	Accurately converts fractions, decimals and percentages.	Compares representations and explains equivalence clearly.	Selects efficient representations and justifies precise comparisons.
Experimental investigations	Records limited results and needs help interpreting data.	Records trials and identifies a basic experimental result.	Calculates experimental probability and compares it with theory.	Explains variation and the effect of repeated trials.	Evaluates reliability, sample size and fairness using evidence.
Reasoning and communication	Gives incomplete working or explanations.	Shows some working and uses basic probability language.	Shows clear working and communicates justified conclusions.	Uses evidence to justify decisions and critique claims.	Builds convincing arguments, tests assumptions and generalises findings.



PREVIEW

Year 6 Probability



Learning Goals

- Describe likelihood from impossible to certain.
- Calculate probability from equally likely outcomes.
- Represent probability as a fraction, decimal, and percentage.
- Compare theoretical and experimental results.
- Use sample size and scaling to judge predictions and fairness.



Probability Language

Probability measures how likely an event is.

0 = impossible 0.5 = even chance 1 = certain

Values closer to 0 are less likely. Values closer to 1 are more likely.

Use probability language: impossible, unlikely, even chance, likely and certain.



The Probability Rule

For equally likely outcomes:

$$p(\text{event}) = \frac{\text{favourable outcomes}}{\text{total possible outcomes}}$$

Example: A fair coin has 2 possible outcomes.

Rolling a die has 6 possible outcomes. Three favourable outcomes: 2, 4 and 6.

$$p(\text{event}) = \frac{3}{6} = \frac{1}{2}$$



Probability as a Fraction

The denominator shows the total number of equally likely outcomes.

The numerator shows how many outcomes match the event we are looking for.

Example: A bag contains 4 balls, 3 green and 1 orange counter.

$$p(\text{green}) = \frac{3}{4}$$

Always simplify your fraction: $\frac{4}{4} = 1$, $\frac{2}{4} = \frac{1}{2}$.



Fractions, Decimals and Percentages

Equivalent forms describe the same probability

$$1/4 = 0.25 = 25\%$$

$$3/5 = 0.6 = 60\%$$

$$7/10 = 0.7 = 70\%$$

Fraction to decimal: divide numerator by denominator.

Decimal to percentage: multiply by 100.



Compare and Order Probabilities

Convert probabilities to the same form before comparing them.

Example: Compare $\frac{3}{8}$ and 40%

$$\frac{3}{8} = 0.375 = 37.5\%$$

$$40\% = 0.4$$

Therefore, 40% is more likely than $\frac{3}{8}$.



Build a Complete Sample Space

A sample space lists every possible outcome once.

For one fair die: $\{1, 2, 3, 4, 5, 6\}$

For a coin and a die, pair each coin result with every die result.

A complete sample space helps you count outcomes accurately and avoid missing combinations.



Two Dice: Outcomes and Sums

Two fair dice create $6 \times 6 = 36$ equally likely ordered outcomes.

Sums are not equally likely.

There is 1 way to make 2, but 5 ways to make 7.

$P(\text{sum} = 6) = 5/36 \approx 14\%$

A grid or organised list shows every combination.



Theoretical Probability

Theoretical probability is calculated before an experiment.
It uses the structure of equally likely outcomes.

Example: A spinner has 8 equal sections: 3 blue, 3 yellow and 2 green.

$P(\text{blue}) = 3/8$ or $P(\text{green}) = 2/8 = 1/4$.



Experimental Probability

Experimental probability comes from observed results.

$p(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total trials}}$

Example: Blue occurs 15 times in 30 spins.

$p(\text{blue}) = \frac{15}{30} = 0.5 = 50\%$



Theory and Experiment

Theoretical probability predicts what should happen in the long run.
Experimental probability records what actually happened.

Short experiments can differ from theory because of random variation.

Compare the values, describe the difference and use evidence rather than expecting an exact match.



Repeat Trials

A single trial tells us very little. Repeated trials reveal patterns.

Combine results carefully:

Total successes $\div$ total trials

As trials increase, more runs have less influence, so experimental proportions often move closer to theoretical probability.



Sample Size and Reliability

A larger sample does not guarantee a perfect result, but it usually gives a more stable estimate.

Compare 4 successes in 5 trials with 4 successes in 100 trials.

Both equal 80%, but the 100-trial sample gives stronger evidence because one result changes the proportion less.



Scale a Sample

Use proportional reasoning to estimate a large group.

If 6 out of 20 trials are successful, the rate is $6/20 = 0.3$.

For 300 trials: $0.3 \times 300 = 90$ expected successes.

State that this is an estimate and not a guarantee.



Is the Game Fair?

A fair two-player game gives both players the same probability of winning.

Spinner: 3 blue, 3 yellow and 2 green equal sections.

Player A wins on blue: Player B wins on yellow, green means replay.

Both winning events have probability $\frac{3}{8}$ so the rule is fair.



Worked Investigation

A 12-section wheel has 5 blue, 4 yellow, 2 green and 1 red section.

1. Predict each colour as a fraction, decimal or percentage.
2. Run or analyse repeated spins.
3. Compare expected and observed results.
4. Scale theoretical probability to 240 spins.
5. Explain how a larger sample could strengthen the conclusion.



Question 1 · True or False

An event with probability 0.25 is less likely than an event with probability 0.4.

True or false?

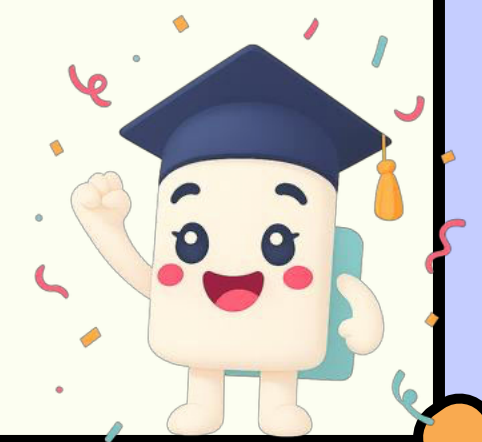
PREVIEW



Answer 1

True.

0.25 is less than 0.4, so the first event is less likely.



Question 2 · Short Answer

A fair six-sided die is rolled.

What is the probability of rolling a number greater than 4?

Give your answer as a simplified fraction.



Answer 2

The favourable outcomes are 5 and 6.

$$p(\text{number greater than 4}) = \frac{2}{6} = \frac{1}{3}.$$



Question 3 · Multiple Choice

Which pair is equivalent to $\frac{3}{5}$?

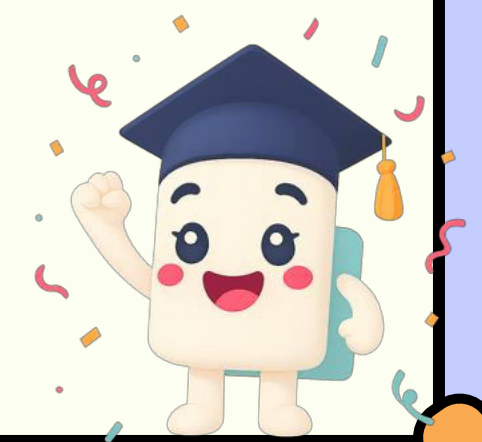
- A. 0.03 and 3%
- B. 0.6 and 60%
- C. 0.5 and 50%
- D. 0.7 and 75%



Answer 3

B. 0.6 and 60%.

$$3 \div 5 = 0.6, \text{ and } 0.6 \times 100 = 60\%$$



Question 4 · Multiple Choice

A bag gives $P(\text{red}) = 3/8$. A spinner gives $P(\text{red}) = 37.5\%$. Which event is more likely?

- A. The bag
- B. The spinner
- C. They are equal
- D. There is not enough information



Answer 4

B. The spinner.

$3/8 = 0.375 = 37.5\%$, which is less than 40



Question 5 · Short Answer

A fair spinner has six equal sections labelled R, B, B, and G.

List the complete sample space and calculate $P(\text{blue})$.



Answer 5

Sample space: {R, R, B, B, B, G}.

There are 3 blue sections out of 6.

$$p(\text{blue}) = 3/6 = 1/2.$$



Question 6 · True or False

After 20 trials, experimental probability must be exactly equal to theoretical probability.

True or false?



Answer 6

False.

Experimental results can vary, especially with a small sample. More trials usually make the proportion more stable, but exact match is not guaranteed.



Question 7 · Multiple Choice

Two fair dice are rolled. What is the probability that the sum is 7?

A. $1/36$

B. $5/36$

C. $1/6$

D. $1/2$



Answer 7

C. $\frac{1}{6}$.

Six of the 36 equally likely ordered outcomes have a sum of 7.

$$\frac{6}{36} = \frac{1}{6}.$$



Question 8 · Short Answer

A spinner lands on blue 18 times in 30 trials.

Write the experimental probability of blue as a simplified fraction, decimal and percentage.



Answer 8

$$18/30 = 3/5 = 0.6 = 60\%.$$

PREVIEW



Question Nine · Multiple Choice

In a sample, 4 out of 20 counters are orange. How many orange counters would you expect in a group of 250?

- A. 20
- B. 40
- C. 50
- D. 80



Answer Nine

C. 50.

$4/20 = 0.2$, and $0.2 \times 250 = 50$



Question 10 · Short Reasoning

A spinner has 8 equal sections: 3 blue, 3 yellow and 2 green.
Player A wins on blue, Player B wins on yellow and green. If the spinner is spun and it is green, the game is replayed.

Is the game fair? Justify your answer.



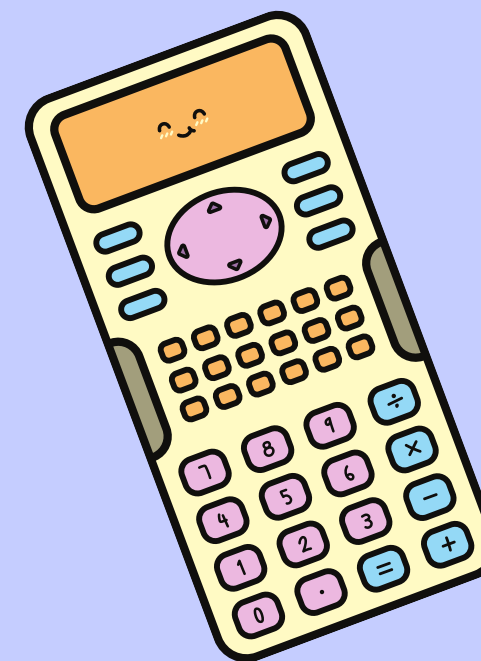
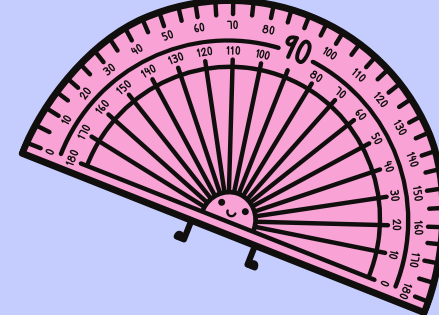
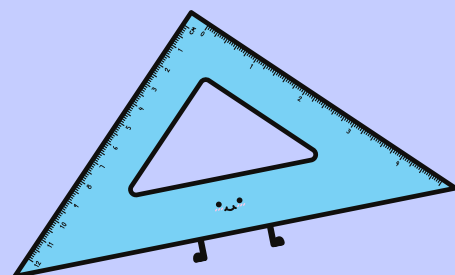
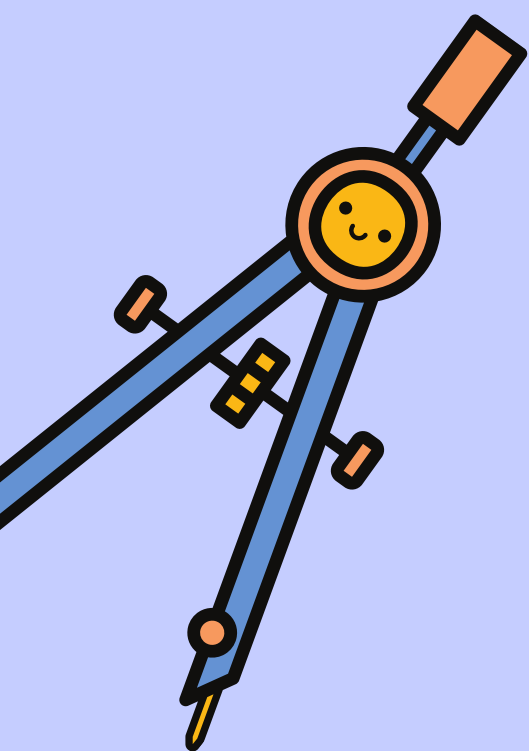
Answer 10

Yes. The game is fair.

$p(\text{Player A wins}) = 3/8$ and $p(\text{Player B wins}) = 3/8$.

The replay sections do not include either player.





PREVIEW

Well done!
Quiz complete!

