Year 5 Probability

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EQUAL OR NOT?

Describe the outcomes before you decide how likely they are.

1. LIST THE SAMPLE SPACE

Write every possible outcome.

Die: {1, 2, 3, 4, 5, 6}

2. CHECK THE OUTCOMES

EQUALLY LIKELY

Each outcome has the same chance.

UNEQUALLY LIKELY

Some outcomes have a greater chance.

3. PREDICT, TRIAL, TALLY

PREDICT → **TRIAL** → **TALLY**

Repeat the experiment and record the frequency of each outcome.

4. DECIDE IF IT IS FAIR

A fair game gives each player equal chance of winning.

LIKELIHOOD SORT

Place each scenario card where it belongs. Be ready to justify your choice.

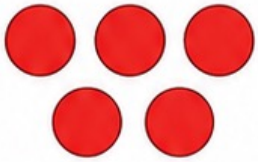
IMPOSSIBLE	UNLIKELY	EVEN CHANCE	LIKELY	CERTAIN
0	between 0 and 1/2	1/2	between 1/2 and 1	1

Challenge: Can the same event move to a different zone if the sample space changes?

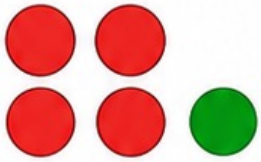
LIKELIHOOD SORT CARDS

Cut out the cards. Sort each event on the Likelihood Sort mat.

Roll a 7 on a fair six-sided die.



Choose a red counter from 5 red counters.



Choose the green counter from 4 red and 1 gree

oose owel
rs
MA

Toss heads on a fair coin.

Roll an even number
a fair die.

Draw a card
om a sta dard deck.

Land on red on a spinner with 2 red and 2 blue equal sectors.

Land on bl
a spinner with 3
and 1 equa
ecto

ellow from 4 yellow and 1 black counter.

Roll a number greater than 2 on a fair die.

Draw a card that is not a heart from a standard deck.

Roll a 6 on a fair six-sided die.

Draw a heart from a standard deck.

Land on red on a spinner with 1 red and 3 blue equal sectors.

Choose a month with 32 days.

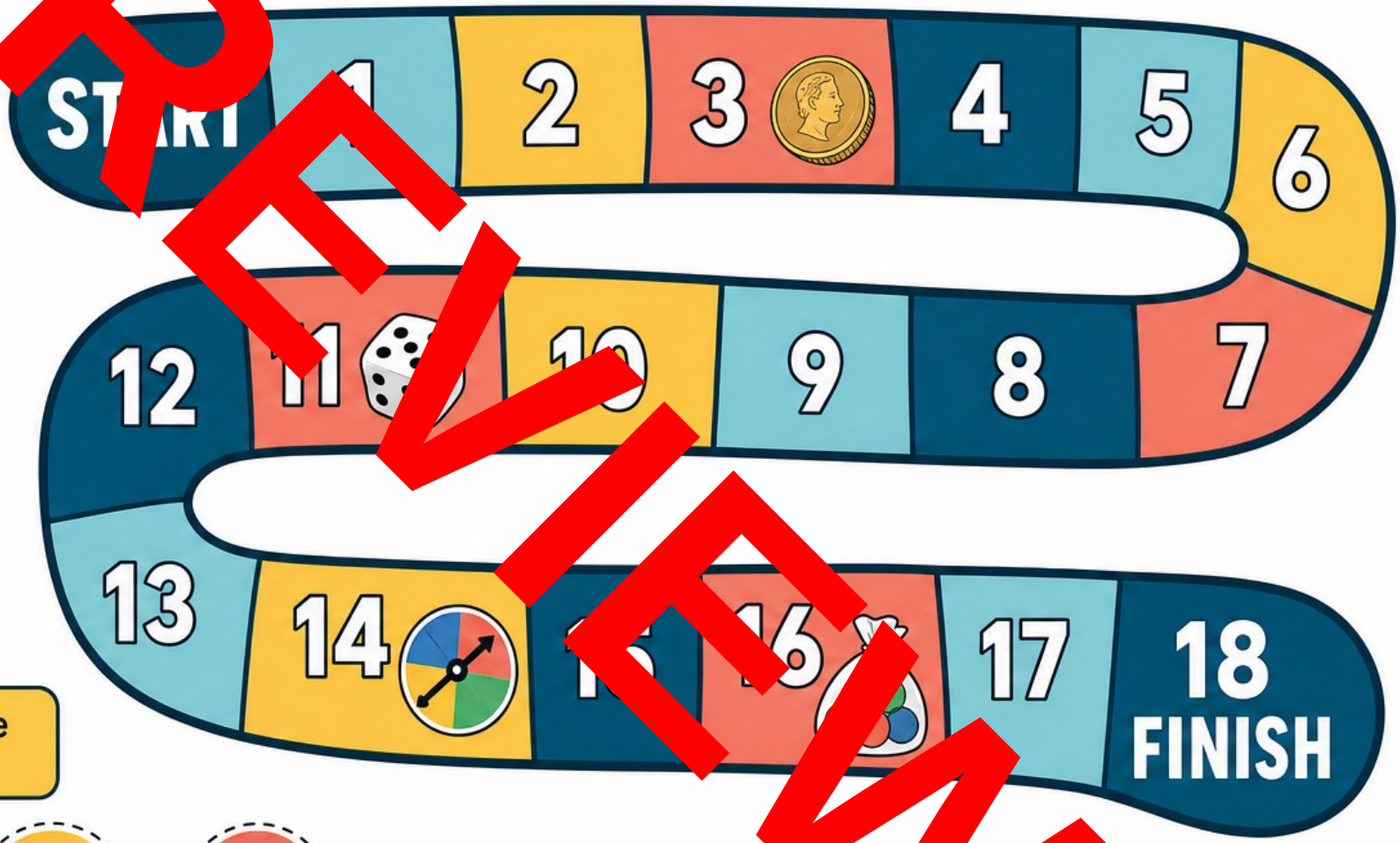
PROBABILITY MATCH

Build a correct set. Move one space. Reach FINISH first!

HOW TO PLAY

1. Shuffle each card type separately.
2. Draw one EVENT, one FRACTION and one WORD card.
3. If all three match, keep the set and move one space.
4. If they do not match, return the cards. First to FINISH wins.

A match describes the same chance in three ways.



P1 P2 P3 P4

PROBABILITY MATCH CARDS

Cut out the cards. Shuffle the three card types separately.

EVENT	FRACTION	WORD
 Heads on a fair coin	1/2	EVEN CHANCE
 Roll a 6 on a fair die	1/6	ONE CHANCE IN SIX
 Roll less than 7 on a fair die	6/6	CERTAIN
 Choose blue from 3 blue and 1 yellow	3/4	THREE CHANCES IN FOUR
 Choose green from 4 red and 1 green	1/5	ONE CHANCE IN FIVE
 Roll a 7 on a fair die	0/6	IMPOSSIBLE

RIVER RACE

Whi[illegible] two dice total will reach the finish first?

Roll two fair dice. Add the numbers. Move the b[illegible]t for that total one space.

RIVER RACE

Predict • Play • Explain

Name: _____

1 SET UP

Place one small counter at START in each lane on the River Race board.

2 HOW TO PLAY

1. Take turns rolling two fair dice.
2. Add the numbers.
3. Move the counter in that total's lane one spac
4. Stop when one counter reaches FINISH.

3 PREDICT AND RECOR

I predict total _____ will wi ecause _____

RACE	WINN TOTAL	NUMBER OF ROLLS	SECOND PLACE
1			
2			
3			

EXP AIN T RESULTS

1. hic tal won most often?

_____

2. Wh the totals not equally likely?

_____

3. Which total can be made in the most ways?

_____

4. How could you change the game to make it fairer?

_____

Hint: Think about all 36 ordered pairs.

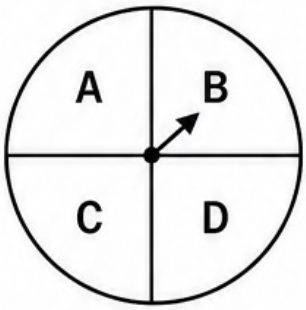
Name: _____ Date: _____

CHANCE CHECK

Show what you already know about possible outcomes and likelihood.

A. SAMPLE SPACE

1. A fair spinner has four equal sections labelled A, B, C and D. List the sample space.



_____

2. Are the four outcomes equally likely? Explain.

_____

_____

B. LIKELIHOOD WORDS

Write *impossible, unlikely, even chance, likely* or ce[illegible].

3. Rolling an 8 on a fair six-sided die: _____

4. Choosing red from a bag with 4 red c[illegible] _____

5. Tossing tails on a fair coin: _____

6. Choosing blue from a ba[illegible]th 3 blu[illegible]d 1 yellow counter: _____

C. FRACTION OF CHANC[illegible]

7. What is the p[illegible]f rolli[illegible]greater than 4 on a fair six-sided die?

_____ / _____ = _____

_____

D. [illegible]DEN[illegible]IALS

A fair c[illegible]lands hea[illegible]four times in a row. Is tails now more likely on the next toss? Explain.

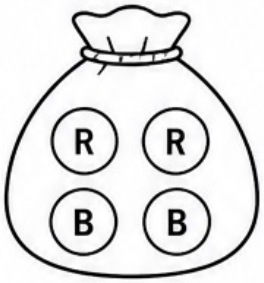
_____

_____

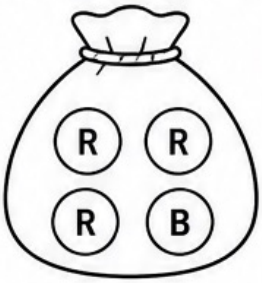
_____

E. COMPARE

BAG A: 2 red, 2 blue



BAG B: 3 red, 1 blue



9. Which bag gives the better chance of choosing red? Use a fraction to justify your answer.

_____

_____

_____

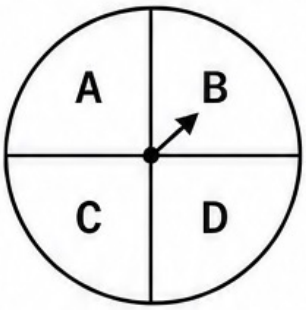
Name: ANSWERS Date: _____

CHANCE CHECK

Show what you already know about possible outcomes and likelihood.

A. SAMPLE SPACE

1. A fair spinner has four equal sections labelled A, B, C and D. List the sample space.



{A, B, C, D}

2. Are the four outcomes equally likely? Explain.

Yes. The four equal sectors each have probability .

B. LIKELIHOOD WORDS

Write *impossible, unlikely, even chance, likely* or ce .

3. Rolling an 8 on a fair six-sided die: impossible

4. Choosing red from a bag with 4 red c in

5. Tossing tails on a fair coin: n chance

6. Choosing blue from a ba th 3 blu d 1 yellow counter: likely

C. FRACTION OF CHANC

7. What is the p f rolli greater than 4 on a fair six-sided die?

2 / 6 = 1/3

The fav le 5 and 6.

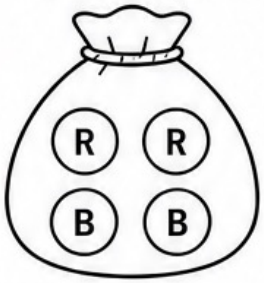
D. DEN IALS

A fair c ands hea four times in a row. Is tails now more likely on the next toss? Explain.

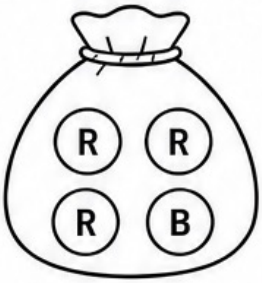
No, each fair coin toss is independent, so tails still has probability 1/2.

E. COMPARE

BAG A: 2 red, 2 blue



BAG B: 3 red, 1 blue



9. Which bag gives the better chance of choosing red? Use a fraction to justify your answer.

Bag B. Its probability is 3/4; Bag A has 2/4 = 1/2.

Name: _____ Date: _____

FRACTIONS OF CHANCE

Part 1 — Sample spaces and equally likely outcomes

Probability = favourable outcomes / total equally likely outcomes

A. LIST THE SAMPLE SPACE

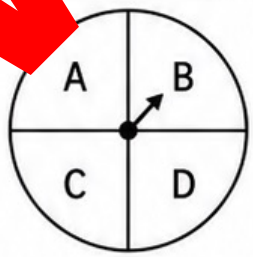
1. A fair six-sided die is rolled. List all possible outcomes.

_____

2. A fair coin is tossed. List all possible outcomes.

_____

3. A spinner has four equal sections labelled A, B, C and D. List the possible outcomes.



_____

B. WRITE THE PROBABILITY

Write each probability as a fraction. Simplify when you can.

4. Rolling an odd number on a fair six-sided die

favourable outcomes: _____ probability: _____ / _____ = _____

5. Landing on B or D on the four-section spinner

favourable outcomes: _____ probability: _____ / _____ = _____

6. Choosing a star from a bag with 3 stars and 2 circles.

favourable outcomes: _____ probability: _____ / _____ = _____

Choosing a vowel from the letters **CHANCE**.

C	H	A	N	C	E

favourable outcomes: _____ probability: _____ / _____ = _____

C. CONNECT THE FRACTION TO A WORD

8. Match each fraction to impossible, unlikely, even chance, likely or certain.

0/6 _____

1/6 _____

3/6 _____

5/6 _____

6/6 _____

Name: ANSWERS Date: _____

FRACTIONS OF CHANCE

Part 1 — Sample spaces and equally likely outcomes

Probability = favourable outcomes / total equally likely outcomes

A. LIST THE SAMPLE SPACE

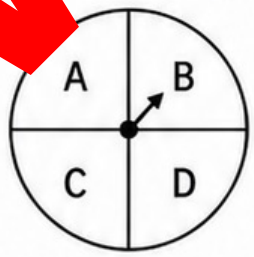
1. A fair six-sided die is rolled. List all possible outcomes.

{1, 2, 3, 4, 5, 6}

2. A fair coin is tossed. List all possible outcomes.

{heads, tails}

3. A spinner has four equal sections labelled A, B, C and D. List all possible outcomes.



{A, B, C, D}

B. WRITE THE PROBABILITY

Write each probability as a fraction. Simplify when you can.

4. Rolling an odd number on a fair six-sided die

favourable outcomes: 1, 3, 5 probability: 3 / 6 = 1 /2

5. Landing on B or D on the four-section spinner

favourable outcomes: B, D probability: 2 / 4 = 1 /2

6. Choosing a star from a bag with 3 stars and 2 circles.

favourable outcomes: 3 stars probability: 3 / 5 = 3 /5

Choosing a vowel from the letters **CHANCE**.

favourable outcomes: A, E probability: 2 / 6 = 1 /3

C. CONNECT THE FRACTION TO A WORD

8. Match each fraction to impossible, unlikely, even chance, likely or certain.

0/6 — impossible

1/6 — unlikely

3/6 — even chance

5/6 — likely

6/6 — certain

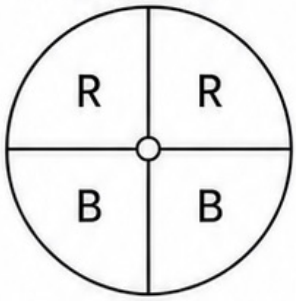
Name: _____ Date: _____

FRACTIONS OF CHANCE

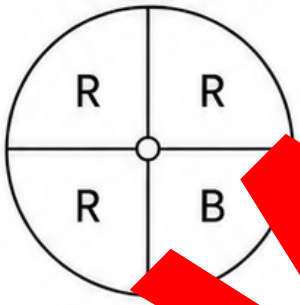
Part 2 — Compare and justify

A. COMPARE THE SPINNERS

SPINNER A



SPINNER B



1. Complete: Spinner A P(red) = ____ / ____ Spinner B P(red) ____ / ____

2. Which spinner gives a better chance of red? Explain.

3. Are the colour outcomes equally likely on each spinner? Explain.

B. FAIR OR UNFAIR?

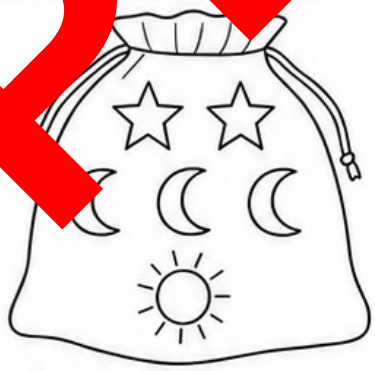
GAME 1: Roll a fair die.
Player 1 wins on even.
Player 2 wins on odd.

GAME 2: Roll a fair die.
Player 1 wins on 1 or 2.
Player 2 wins on 3, 4, 5 or 6.

4. Decide whether each game is fair or unfair. Use fractions.

5. Change the rule in Game 2 to make it fair.

C. IDEAS ABOUT A BAG



6. Write P(star), P(moon) and P(sun). Order them from least to greatest.

7. What should be added to make the three shapes equally likely? Explain.

D. CHALLENGE

8. A spinner has 8 equal sections. Three are striped. What is P(not striped)? ____ / ____

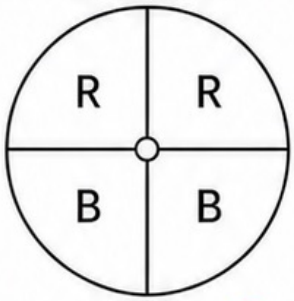
Name: ANSWERS Date: _____

FRACTIONS OF CHANCE

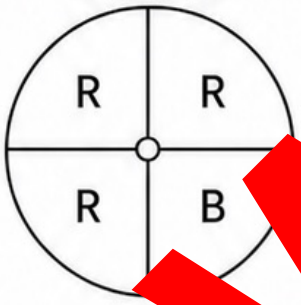
Part 2 — Compare and justify

A. COMPARE THE SPINNERS

SPINNER A



SPINNER B



1. Complete: Spinner A P(red) = 2 / 4 Spinner B P(red) = 3 / 4

2. Which spinner gives a better chance of red? Explain.

Spinner B, because 3/4 is greater than 2/4.

3. Are the colour outcomes equally likely on each spinner? Explain.

Spinner A: yes, red = blue = 2/4. Spinner B: no, red = 3/4 and blue = 1/4.

B. FAIR OR UNFAIR?

GAME 1: Roll a fair die.
Player 1 wins on even.
Player 2 wins on odd.

GAME 2: Roll a fair die.
Player 1 wins on 1 or 2.
Player 2 wins on 3, 4, 5 or 6.

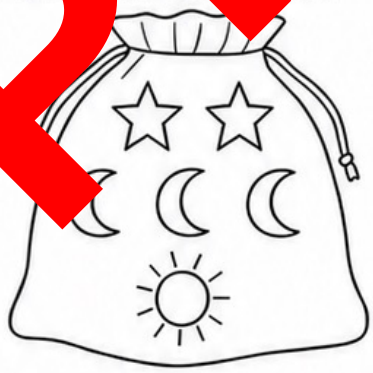
4. Decide whether each game is fair or unfair. Use fractions.

Game 1 is fair: player 1 has 3/6 and player 2 has 3/6. Game 2 is unfair: Player 1 has 2/6; Player 2 has 4/6.

5. Change the rule in Game 2 to make it fair.

Player 1 wins on 1, 2 or 3; Player 2 wins on 4, 5 or 6.

C. IDEAS ABOUT BAG



6. Write P(star), P(moon) and P(sun). Order them from least to greatest.

P(star) = 2/6 = 1/3; P(moon) = 3/6 = 1/2; P(sun) = 1/6.

least to greatest: sun, star, moon.

7. What should be added to make the three shapes equally likely? Explain.

Add 1 star and 2 suns. Then each shape has 3 counters.

D. CHALLENGE

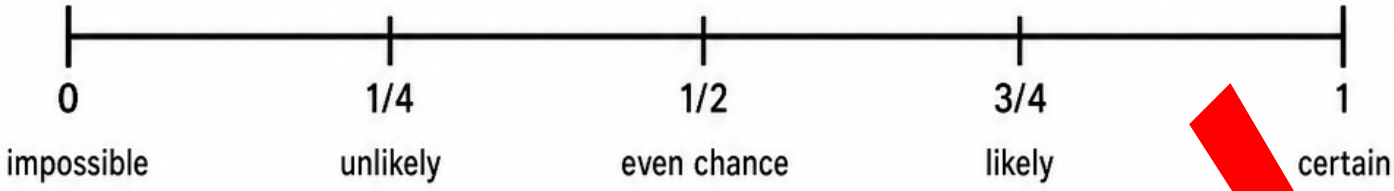
8. A spinner has 8 equal sections. Three are striped. What is P(not striped)? 5 / 8

Five of the eight sections are not striped.

Name: _____ Date: _____

PROBABILITY LINE

Place, compare and justify likelihoods from 0 to 1.



A. PLACE THE EVENTS

Write each letter above the best position on the probability line.

A. Roll a 7 on a fair six-sided die.

B. Draw a heart from a standard deck.

C. Toss heads on a fair coin.

D. Roll a 6 on a fair six-sided die.

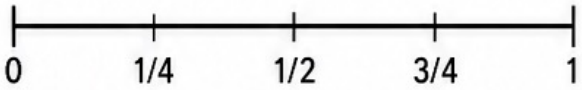
E. Roll a number greater than 2 on a fair six-sided die.

F. Choose white from a bag containing 4 white counters.

B. CALCULATE AND LOCATE

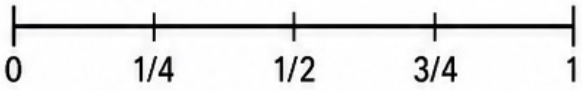
7. A spinner has 8 equal sections; 3 sections show a triangle. Write P(triangle) and mark it on the mini line.

P(triangle) = _____



8. A bag has 5 squares and 3 circles. Write P(star) and mark it on the mini line.

P(star) = _____



C. REASONING

9. An event has probability 3/4. What is the probability that it does not happen? Explain.

_____

_____

10. Create an event that is likely but not certain. State its sample space and probability.

_____

_____

_____

Name: ANSWERS Date: _____

PROBABILITY LINE

Place, compare and justify likelihoods from 0 to 1.

A. PLACE THE EVENTS

Write each letter above the best position on the probability line.

A. Roll a 7 on a fair six-sided die.

B. Draw a heart from a standard deck.

C. Toss heads on a fair coin.

D. Roll a 6 on a fair six-sided die.

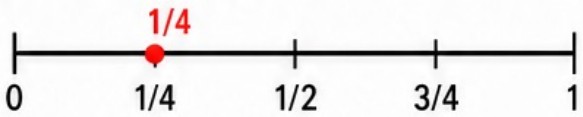
E. Roll a number greater than 2 on a fair six-sided die.

F. Choose white from a bag containing 4 white counters.

B. CALCULATE AND LOCATE

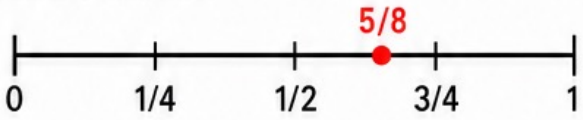
7. A spinner has 8 equal sections. 2 sections show a triangle. Write P(triangle) and mark it on the mini line.

P(triangle) = 2/8 = 1/4



8. A bag has 5 squares and 3 circles. Write P(star) and mark it on the mini line.

P(star) = 5/8



C. REASON

9. An event has probability 3/4. What is the probability that it does not happen? Explain.

1/4. An event and its complement add to 1.

10. Create an event that is likely but not certain. State its sample space and probability.

Example: roll a number greater than 2 on a fair die.

Sample space {1, 2, 3, 4, 5, 6}; favourable outcomes {3, 4, 5, 6}; probability 4/6 = 2/3.

Name: _____ Date: _____

CARD PROBABILITY

Use the standard 52-card deck as the sample space.

52 cards • 4 suits • 13 cards in each suit

26 red cards: hearts and diamonds ♡ ♢

26 black cards: clubs and spades ♧ ♤

4 cards of each rank: A, 2–10, J, Q, K

A. WRITE AND SIMPLIFY

Write each probability as a fraction of 52. Simplify when possible.

1. Draw a red card. _____ / 52 = _____
2. Draw a club. _____ / 52 = _____
3. Draw a king. _____ / 52 = _____
4. Draw a red ace. _____ / 52 = _____
5. Draw the queen of hearts. _____ / 52
6. Draw a card that is not a heart. _____ / 52 = _____

B. COMPARE

7. Which is more likely: drawing a king or drawing a club? Use fractions to explain.

_____

_____

8. Order these events from least to greatest probability: draw the ace of spades; draw a face card (J, Q, K); draw a red card.

least _____ middle _____ greatest _____

REASONING

9. A card is drawn, replaced and the deck is shuffled. A second card is drawn. Does the first card change the probability of the second draw? Explain.

_____

_____

10. Create an event with probability $\frac{1}{4}$. Name the event and justify it.

_____

_____

Name: ANSWERS Date: _____

CARD PROBABILITY

Use the standard 52-card deck as the sample space.

52 cards • 4 suits • 13 cards in each suit

26 red cards: hearts and diamonds 

26 black cards: clubs and spades 

4 cards of each rank: A, 2–10, J, Q, K

A. WRITE AND SIMPLIFY

Write each probability as a fraction of 52. Simplify when possible.

1. Draw a red card. 26 / 52 = $\frac{1}{2}$
2. Draw a club. 13 / 52 = $\frac{1}{4}$
3. Draw a king. 4 / 52 = $\frac{1}{13}$
4. Draw a red ace. 2 / 52 = $\frac{1}{26}$
5. Draw the queen of hearts. 1 / 52
6. Draw a card that is not a heart. 39 / 52 = $\frac{3}{4}$

B. COMPARE

7. Which is more likely: drawing a king or drawing a club? Use fractions to explain.

   A club is more likely (13/52 = 1/4, while a king is 4/52 = 1/13.

8. Order the events from least to greatest probability: draw the ace of spades; draw a picture card (J, Q or K); draw a red card.

   least ace of spades middle picture card greatest red card

REASON

9. A card is drawn, replaced and the deck is shuffled. A second card is drawn. Does the first card change the probability of the second draw? Explain.

   No. Replacement restores the same 52-card sample space, so the second draw is independent.

10. Create an event with probability $\frac{1}{4}$. Name the event and justify it.

    Example: draw a club. There are 13 clubs, so 13/52 = 1/4.

SPINNER DESIGNER

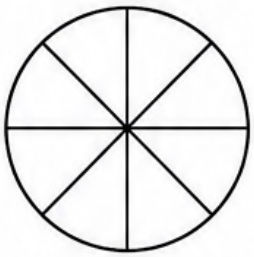
Name: _____ Date: _____

Build spinners that match each probability rule.

A. MATCH THE RULE

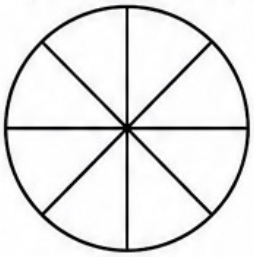
Label every equal section. Then write each probability.

1. This spinner has 8 equal sections. Make P(triangle) = 1/4.
Label all other sections circle.



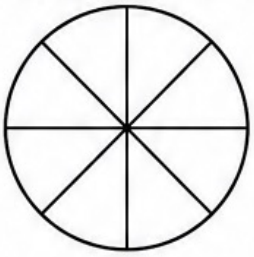
P(triangle) = _____ / _____ P(circle) = _____ / _____

2. This spinner has 8 equal sections. Make blue three times as likely as yell



P(blue) = _____ / _____ P(ow) = _____ / _____

3. This spinner has 8 equal sections. Make P(star) /8 and cle) =
Use square for the remaining section.



P(s e) = _____

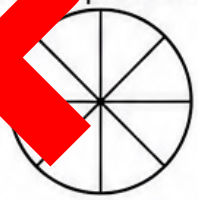
B. DESIGN A GAME

4. Players spin an 8 spinne er 1 s on A. Player 2 wins on B.
Design a fair er ar stify it w ions.

_____

_____

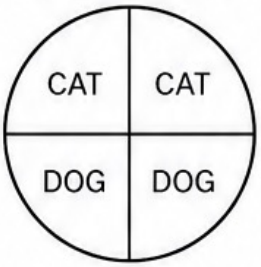
Redesign game s s unfair but both players can still win.
Write b probabilities.



_____

_____

C. CHECK A CLAIM



6. Sam says CAT is more likely because the pointer is closer to a CAT section.
Is Sam correct? Explain.

_____

_____

_____

SPINNER DESIGNER

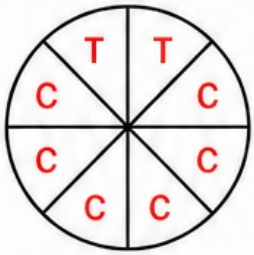
Name: ANSWERS Date: _____

Build spinners that match each probability rule.

A. MATCH THE RULE

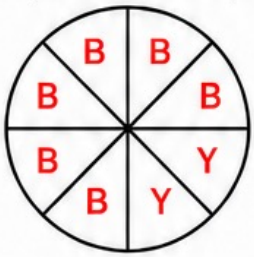
Label every equal section. Then write each probability.

1. This spinner has 8 equal sections. Make P(triangle) = 1/4.
Label all other sections circle.



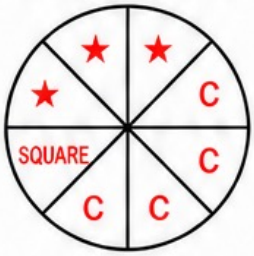
P(triangle) = 2 / 8 P(circle) = 6 / 8

2. This spinner has 8 equal sections. Make blue three times as likely as yell



P(blue) = 6 / 8 P(w) = 2 / 8

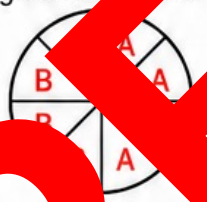
3. This spinner has 8 equal sections. Make P(star) /8 and cle) =
Use square for the remaining section.



P(s e) = _____

B. DESIGN A GAME

4. Players spin an 8 spinne er 1 s on A. Player 2 wins on B.
Design a fair er a stify it w ions.

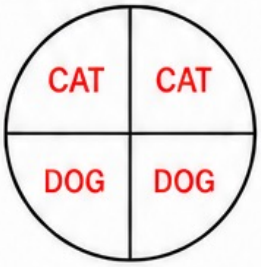


= 4/8 = 1/2; P(B) = 4/8 = 1/2, so the game is fair.

Redesign e game s s unfair but both players can still win.
Write h probabilities.

One valid design: P(A) = 6/8 = 3/4; P(B) = 2/8 = 1/4.

C. CHECK A CLAIM



6. Sam says CAT is more likely because the pointer is closer to a CAT section. Is Sam correct? Explain.

No. CAT = 2/4 = 1/2 and DOG = 2/4 = 1/2. The pointer's starting position does not change the equal sectors.

Name: _____ Date: _____

DICE SUMS AND SAMPLE SPACES

Part 1 — Build the 36-outcome table

Roll two fair six-sided dice. Each cell represents one ordered pair. Add the row number and column number, then write the total in the cell.

DIE 2

DIE 1 + DIE 2	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

DIE 1

A. NOTICE THE STRUCTUR

1. How many ordered pa e in t omplete sample space? _____

2. List every orde ir that a tota 4.

_____

3. List eve dered ives a total of 7.

_____

_____

Whic o totals can each be made in only one way? _____ and _____

B. R ON

5. Are t totals 2 to 12 equally likely? Use the table to explain.

_____

_____

_____

6. Predict the most likely total. Explain your reasoning.

_____

_____

Name: ANSWERS Date: _____

DICE SUMS AND SAMPLE SPACES

Part 1 — Build the 36-outcome table

Roll two fair six-sided dice. Each cell represents one ordered pair. Add the row number and column number, then write the total in the cell.

DIE 2

DIE 1 + DIE 2	1	2	3	4	5	6
1	2	3	4	5		
2	3	4	5		7	8
3	4	5	6	7	8	9
4	5	6			9	10
5	6	7	8	9	10	11
6	7			10	11	12

DIE 1

A. NOTICE THE STRUCTUR

1. How many ordered pa e in t omplete sample space? 36

2. List every orde ir that a tota 4.

(1, 3), (2 (3, 1)

3. List eve dered a total of 7.

(2, 4), (4, 3), (5, 2), (6, 1)

Whic o totals can each be made in only one way? 2 and 12

B. R ON

5. Are t totals 2 to 12 equally likely? Use the table to explain.

No. The number of ordered pairs varies. Total 7 has 6 ways, while totals 2 and 12 have 1 way each.

6. Predict the most likely total. Explain your reasoning.

Total 7. It can be made in 6 of the 36 ordered pairs.

Name: _____ Date: _____

DICE SUMS AND SAMPLE SPACES

Part 2 — Compare theoretical and observed results

A. COUNT THE WAYS

Use your 36-outcome table from Part 1.

TOTAL	2	3	4	5	6	7	8	9	10	11	12
WAYS											
FRACTION	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36	___ / 36

B. CALCULATE

1. P(total of 7) = _____ / 36 = _____
2. P(total of 6 or 8) = _____ / 36 = _____
3. P(total of at least 10) = _____ / 36 = _____
4. P(even total) = _____ / 36 = _____
5. Which is more likely: a total of 5 or a total of 10? Explain.

_____

_____

C. IS THE GAME FAIR?

Player A wins on totals 2–6. Player B wins on totals 8–12. Roll again on 7.

6. Is the game fair? Count the winning ordered pairs for each player.

Player A: _____ Player B: _____ / 36

_____

_____

7. If Player A also wins on 7, is the game still fair? Explain.

_____

_____

D. COMPARE WITH AN EXPERIMENT

60 rolls: 2:2 3:3 4:5 5:7 6:8 7:10 8:8 9:7 10:5 11:3 12:2

8. Which total occurred most often? _____
9. How closely do these results match the theoretical pattern? Give two pieces of evidence.

_____

_____

_____

10. Would another 60 rolls have exactly the same frequencies? Explain.

_____

_____

Name: ANSWERS Date: _____

DICE SUMS AND SAMPLE SPACES

Part 2 — Compare theoretical and observed results

A. COUNT THE WAYS

Use your 36-outcome table from Part 1.

TOTAL	2	3	4	5	6	7	8	9	10	11	12
WAYS	1	2	3	4	5	6	5	4	3		1
FRACTION	1 / 36	2 / 36	3 / 36	4 / 36	5 / 36	6 / 36	5 / 36	4 / 36		2 /	1 / 36

B. CALCULATE

1. P(total of 7) = 6 / 36 = 1/6
2. P(total of 6 or 8) = 10 / 36 = 5/18
3. P(total of at least 10) = 6 / 36 = 1/6
4. P(even total) = 18 / 36 = 1/2
5. Which is more likely: a total of 5 or a total of 10? Explain.

A total of 5 is more likely: 4 / 36 compared wit /36 for a of 10.

C. IS THE GAME FAIR?

Player A wins totals 2– Player B wins on totals 8–12. Roll again on 7.

6. Is the game fair? Count t inni ordered irs for each player.

Player A: 15 / r B: 5 / 36

Yes. Each pl has vinning d pairs; a 7 is rolled again.

7. If Player A at 7, is the game still fair? Explain.

A w have 21/36 and Player B would have 15/36.

D. MP WITH AN EXPERIMENT

60 rolls: 2:2 3:3 4:5 5:7 6:8 7:10 8:8 9:7 10:5 11:3 12:2

8. Which occurred most often? 7
9. How closely do these results match the theoretical pattern? Give two pieces of evidence.

The pattern is close: 7 occurred most often, and symmetric totals such as 6 and 8 had equal frequencies.

10. Would another 60 rolls have exactly the same frequencies? Explain.

No. Random variation means another 60 rolls may have different frequencies, even though the overall pattern should be similar.

Name: _____ Date: _____

EXPERIMENTAL PROBABILITY LAB

Part 1 — Plan and collect 40 trials

A. CHOOSE ONE EXPERIMENT

A. Toss a fair coin. Target event: heads.	**B.** Roll a fair six-sided die. Target event: a number greater than 4.	**C.** Spin four equal sections labelled S, S, and N. Target even

Circle A, B or C. Use the same equipment and method for every trial.

B. PLAN

1. Sample space: _____
2. Are the outcomes equally likely? Explain. _____
3. Theoretical probability of the target event: _____
4. Predicted target frequency in 40 trials: _____

C. RECORD EVERY TRIAL

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21			24	25
26	27	28	29	30
31	32	33	34	35
36		38	39	40

D. LY

TCOME	TALLY	FREQUENCY

Check: total frequency = _____

EXPERIMENTAL PROBABILITY LAB

Part 2 — Analyse, compare and explain

Name: _____ Date: _____

A. YOUR RESULTS

1. Chosen experiment: A / B / C
2. Target event: _____
3. Observed target frequency: _____ out of 40
4. Experimental probability of the target event: _____ / 40 = _____
5. How did the observed frequency compare with your prediction?

_____

_____

_____

6. Which outcome occurred most often? Which occurred least often?

_____

_____

B. COMPARE GROUP DATA

Record two other groups' results for the same experiment.

GROUP	TRIALS	TARG QUENC	ERIMENTAL PROBABILITY
Mine			
Group 2			
Group 3			

7. Which result is closest to the theo al probability? Expla

_____

_____

8. Combine the three target frequ What is th led experimental probability?

total target freq / t ials = _____

_____

C. USE THE ENCE

9. Does a short have to ma n the theoretical probability exactly? Explain.

_____

_____

_____

f the eriment continued for 400 trials, what pattern would you expect? Why?

_____

_____

_____

11. Were your original outcomes equally likely or unequally likely? Use the sample space and frequencies as evidence.

_____

_____

_____

D. IMPROVE THE METHOD

12. Name one change that would make the experiment more reliable or fair.

_____

_____

My evidence shows that _____

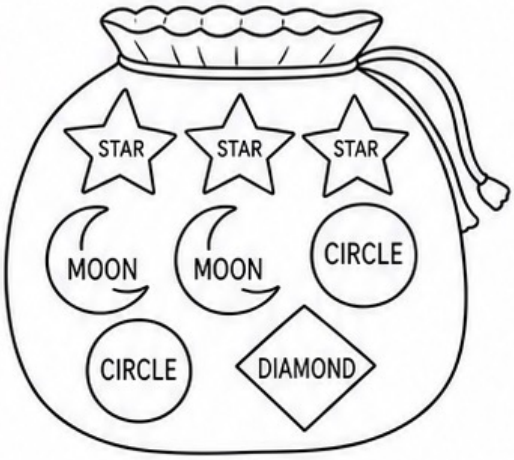
Name: _____ Date: _____

CARNIVAL CHANCE INVESTIGATION

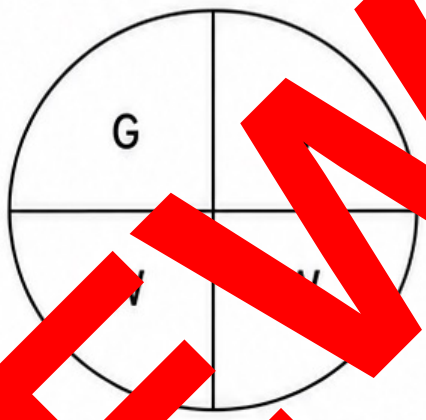
Assessment — Part 1: Sample spaces and predictions

The carnival booth offers two prize games. The equipment is reset after every turn.

GAME A — Draw one token. Win a prize on STAR.



GAME B — Spin once. Win a prize on GOLD.



1. List the possible outcome labels for Game A. [2 marks]

_____

2. Are the four Game A outcome labels equally likely? Explain using the token counts. [2 marks]

_____

_____

_____

3. Write P(STAR) for Game A. [1 mark] _____ / _____

4. Write P(not STAR) for Game A. [1 mark] _____ / _____

5. List the possible outcome labels for Game B. [1 mark]

_____

6. Write P(GOLD) and P(not GOLD) for Game B. [2 marks]

P(GOLD) = _____ / _____ P(not GOLD) = _____ / _____

7. Before any trials are run, which game gives a better chance of winning a prize? Compare the fractions. [3 marks]

_____

_____

_____

_____

Part 1 total: ____ / 12

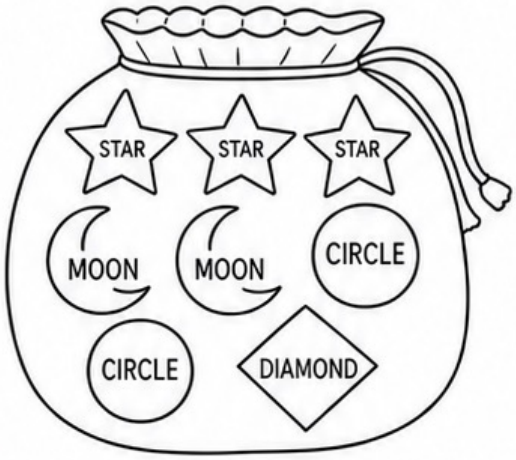
Name: ANSWERS Date: _____

CARNIVAL CHANCE INVESTIGATION

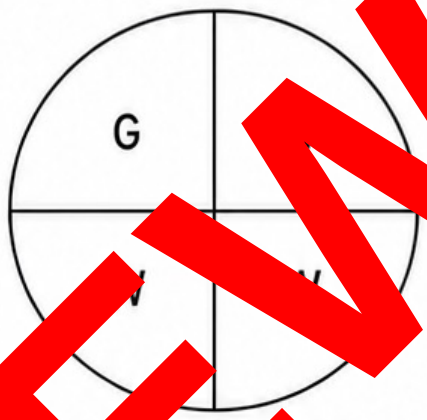
Assessment — Part 1: Sample spaces and predictions

The carnival booth offers two prize games. The equipment is reset after every turn.

GAME A — Draw one token. Win a prize on STAR.



GAME B — Spin once. Win a prize on GOLD.



1. List the possible outcome labels for Game A. [2 marks]

STAR, MOON, CIRCLE, DIAMOND

2. Are the four Game A outcome labels equally likely? Explain using the token counts. [2 marks]

No. The labels have different token counts: STAR 3, MOON 2, CIRCLE 2, DIAMOND 1.

3. Write P(STAR) for Game A. [1 mark] 3 / 8

4. Write P(not STAR) for Game A. [1 mark] 5 / 8

5. List the possible outcome labels for Game B. [1 mark]

GOLD, WHITE

6. Write P(GOLD) and P(not GOLD) for Game B. [2 marks]

P(GOLD) = 1 / 4 P(not GOLD) = 3 / 4

7. Before any trials are run, which game gives a better chance of winning a prize? Compare the fractions. [3 marks]

Game A. P(win) = 3/8. Game B has 1/4 = 2/8. Since 3/8 > 2/8, Game A gives the better chance.

Part 1 total: ____ / 12

Name: _____ Date: _____

CARNIVAL CHANCE INVESTIGATION

Assessment — Part 2: Evidence and fair decisions

Game A theoretical prize probability = 3/8
Game B theoretical prize probability = 1/4

EXPERIMENTAL RESULTS

GAME	PRIZE	NO PRIZE	TOTAL TRIALS
Game A	16	24	
Game B	8	32	

8. Write the experimental prize probability for each game. [2 marks]

   Game A: _____ / 40 = _____ Game B: _____ / 40 = _____

9. Compare each experimental probability with its theoretical probability. [4 marks]

10. Which game's experimental result was closer to its theoretical probability? Show the difference using fractions out of 40. [2 marks]

11. Which game would you recommend to a player who wants the better chance of a prize? Use both theoretical and experimental evidence. [3 marks]

12. Use the 8 in Game A to create a fair two-player game. Player 1 and Player 2 must each have four winning options. State both winning rules. [3 marks]

13. The fourth owner wants a lower prize rate, but prizes must still be possible. Which original game should the owner choose? Justify your decision. [2 marks]

14. Predict how many prizes Game B might give in 80 trials. Explain why this is an estimate, not a guarantee. [2 marks]

Part 2 total: ____ / 18

Assessment total: _____

Name: ANSWERS Date: _____

CARNIVAL CHANCE INVESTIGATION

Assessment — Part 2: Evidence and fair decisions

Game A theoretical prize probability = 3/8
Game B theoretical prize probability = 1/4

EXPERIMENTAL RESULTS

GAME	PRIZE	NO PRIZE	TOTAL TRIALS
Game A	16	24	40
Game B	8	32	40

8. Write the experimental prize probability for each game. [2 marks]

Game A: 16 / 40 = 2/5 Game B: 8 / 40 = 1/5

9. Compare each experimental probability with its theoretical probability. [4 marks]

Game A: 3/8 = 15/40 theoretically; 16/40 was observed, which is 1/40 higher.

Game B: 1/4 = 10/40 theoretically; 8/40 was observed, which is 2/40 lower.

10. Which game's experimental result was closer to its theoretical probability? Show the difference using fractions out of 40. [2 marks]

Game A was closer. Its difference was 1/40; Game B's difference was 2/40.

11. Which game would you recommend to a player who wants the better chance of a prize? Use both theoretical and experimental evidence. [3 marks]

Recommend Game A. Theoretical: 3/8 > 1/4. Experimental: 16/40 > 8/40.

12. Use the 8 orange A tokens to make a fair two-player game. Player 1 and Player 2 must each have four winning tokens. Describe the winning rules. [3 marks]

Player 1 wins on STAR or DIAMOND: 3 + 1 = 4 tokens.

Player 2 wins on MOON or CIRCLE: 2 + 2 = 4 tokens. Each has 4/8 = 1/2.

13. The owner wants a lower prize rate, but prizes must still be possible. Which original game should the owner choose? Justify your decision. [2 marks]

Choose Game B. Its theoretical prize rate is 1/4, lower than 3/8,
and its observed rate 8/40 was lower than Game A's 16/40.

14. Predict how many prizes Game B might give in 80 trials. Explain why this is an estimate, not a guarantee. [2 marks]

About 20 prizes, because 1/4 of 80 is 20. Random variation means
the actual frequency may differ.

Part 2 total: ____ / 18
Assessment total: ____ /

AR 5 PROBABILITY UNIT RUBRIC

AC9M5P01 • AC9M5P02

Student: _____ **Date:** _____ **Overall:** _____

CRITERION	BEGINNING	DEV PING	ACHIEVING	CONFIDENT	EXCEEDING
POSSIBLE OUTCOMES	Lists few outcomes; sample space is incomplete.	ts most ou th prom	Lists complete sample spaces for familiar experiments.	Systematically lists sample spaces, including ordered pairs.	Generalises efficient methods and checks completeness.
EQUAL OR UNEQUAL	Uses chance words inconsistently.	Identi some equally l outcomes.	Co tly distinguishes e l and unequal comes.	Justifies comparisons with counts and fractions.	Evaluates fairness and proposes valid changes.
PROBABILITY FRACTIONS	Needs support to form probability fractions.	Forms simple fractions with some errors.	W d comp s rrect proba fractions.	Simplifies and connects fractions o the 0–1 scale.	Uses complements and equivalent fractions flexibly.
REPEATED TRIALS	Records incomplete or inaccurate trials.	Runs trials with support and a partial tally.	Cond repea trials and re frequencies	Us consistent meth and curate les.	Improves reliability and explains method choices.
EVIDENCE AND REASONING	Makes claims without evidence.	Describes results with limited comparison.	Compares observ frequency with predicted likelihood.	Expla variatio nd use iden fa s.	Synthesises theory and data, then critiques conclusions.

Teacher feedback: _____

Next step: _____

Year 5
Probability

Learning Goals

We are learning to

I can complete sample spaces

compare equal and unequal chances

run trials and use frequency as evidence

Chance Language

Impossible – cannot happen

Unlikely – happens less often than not

Even chance – equally likely to happen or not

Likely – happens more often than not

Certain – must happen

Build a Sample Space

1. Name the [illegible] experiment.
2. [illegible]st every possible outcome.
3. Check that no [illegible] are missing or repeated.

That complete list is the sample space.

Equally Likely

Outcomes are equally likely when each has the same chance.

A fair coin: {heads, tails}

A fair die: {1, 2, 3, 4, 5, 6}

Equal sections on a fair spinner have equal chances.

Unequally Likely

Outcomes are unequally likely when chances differ.

A bag with 6 blue and 2 yellow counters favours blue.

List all outcomes, then count those supporting each event.

More favourable outcomes means a greater theoretical chance.

Probability as a Fraction

Probability = favourable outcomes ÷ total possible outcomes

A fair die: P(even) = 3/6 = 1/2

Ten equal sectors, four red: P(red) = 4/10 = 2/5

Use fractions between 0 and 1.

The Probability Line

0 means impossible; 1 means certain.

½ marks an even chance.

Values nearer 0 are less likely.

Values nearer 1 are more likely.

Place events using evidence, not guesswork.

Cards and Chance

A standard deck has 52 cards in 4 suits of 13.

There are 26 red and 26 black cards.

P(heart) = 13/52 = 1/4

P(face card) = 12/52 = 3/13

Check whether events overlap before adding counts.

Two Dice: Outcomes

Two dice create 6 × 6 = 36 ordered outcomes.

Totals are not equally likely.

A total of 7 has 6 combinations; a total of 2 has 1.

Use a 6-by-6 sample-space table to count each total.

Repeated Experiments

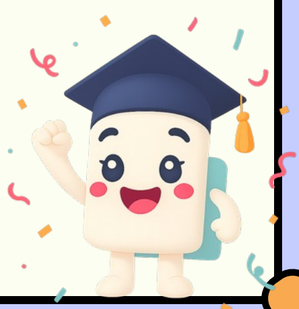
Choose a chance experiment and a prediction.

Run many trials using the same method.

Record each result with a tally.

Frequency = number of times an outcome occurs.

More trials usually reveal a steadier pattern.



Expected and Observed

Theoretical probability predicts what should happen.

Experimental probability shows what did happen.

Experimental probability = frequency ÷ number of trials

Small sample results can differ and still be reasonable.

Independent Trials

Each fair coin toss [illegible] or [illegible] starts afresh.

Previous [illegible] do not [illegible] the next trial.

[illegible] in a row does not make heads ‘due’.

This is independence.

Is the Game Fair?

A fair game gives pl[illegible]qu[illegible] cha[illegible]ces[illegible]nder the rules.

List the w[illegible]nin[illegible]outco[illegible]s for every player.

Comp[illegible]e th[illegible]oreti[illegible]al chances before playing.

Th[illegible] te[illegible] with repeated trials and review the frequencies.

Investigation Challenge

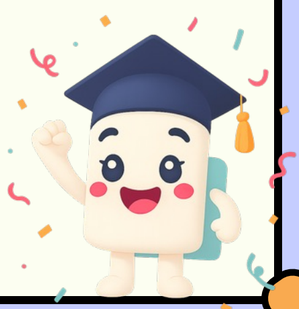
Design two experiments: one equal, one unequal.

Predict each outcome using fractions.

Run at least 30 trials for each experiment.

Compare prediction with observed frequency.

Explain any difference using probability language.



Well done!

Year 5 Probability Quiz

QUESTION 1

Which is the complete sample space for one fair die roll?

A {1, 3, 5}

B {0, 1, 2, 3, 4, 5}

C {1, 2, 3, 4, 5, 6}

D {odd, even, prime}

ANSWER 1

S = {1, 2, 3, 4, 5, 6}

There are six possible outcomes, with none missing.

QUESTION 2

Tru or f se?

A fair spinn has f equal sections:

re blu green and yellow.

ach colour is equally likely.

ANSWER 2

TRUE

Equal sections on a fair spinner give equal chances.

QUESTION 3

A fair d is olled

hat P(number greater than 4)?

ive th fraction in simplest form.

ANSWER 3

Ou[illegible]om[illegible] great[illegible]han 4: {5, 6}

p([illegible]umb[illegible]r gr[illegible]ater than 4) = 2/6 = 1/3

QUESTION 4

A fair spinner has equal sectors:

5 blue, 2 yellow and red

A All colours are equally likely

B [illegible] is most likely

C Blue is most likely

D Yellow is impossible

ANSWER 4

C. Blue is most likely.

Blue covers 5 of the 8 equal sectors, so P(blue) = 5/8.

QUESTION 5

True or false?

A fair coin lands tails four times in a row.

Heads is now more likely on the next toss.

ANSWER 5

FAL

ch to s is ndep dent, so P(heads) stays 1/2.

QUESTION 6

One card is chosen at random

from a standard 52-card deck.

What is P(heart)?

Give the fraction in simplest form.

ANSWER 6

There are 13 hearts in 52 cards.

P(heart) = 13/52 = 1/4

QUESTION 7

Two fair dice are rolled.

Which total is most likely?

A

B 5

C 7

D 12

ANSWER 7

A total of 7

It has 6 ways the 3 ordered outcomes, more than any other total.

QUESTION 8

Tru or f se?

li spi er has blue) = 1/2,

exa lu 1 the next 20 spins

must be blue.

ANSWER 8

F... Si...

T... bi... sp... s are expected, not guaranteed.

...Obse...ed frequency can vary.

QUESTION 9

Team A rolls a 6 in 18 of 100 trials.

Team B rolls a 6 in 17 of 100 trials.

Which is closer to theoretical P(6) = 1/6?

Show the comparison.

ANSWER 9

Team A: 8/4[illegible] = 0.[illegible]

Team B: 16/[illegible] = 0.16

Theoretical: 1/6 ≈ 0.167

Team B is closer.

QUESTION 10

A fair die is rolled once. Which game is fairest?

A Player 1 wins on 1; Player 2 otherwise

B Player 1 wins on odd; Player 2 on even

C Player 1 wins on 1–4; Player 2 on 5–6

D Player 1 wins on 6; Player 2 on 1

ANSWER 10

B Odd [illegible] even

Each player has 3 of the 6 equally likely outcomes,

so each has probability 1/2.

Well done!