



THIRD SPACE
LEARNING

Diagnostic Questions

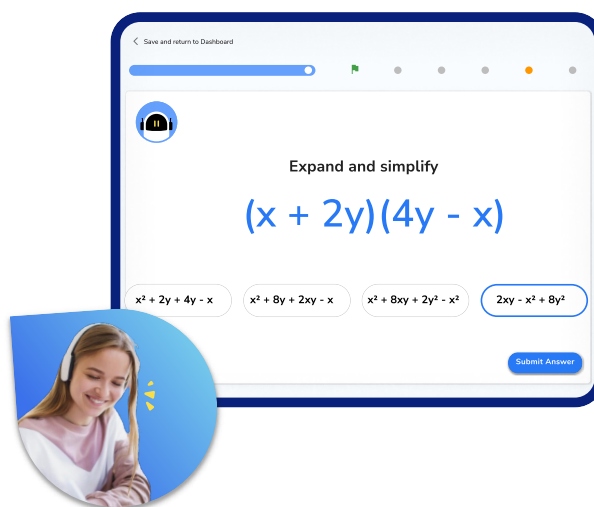
Basic Probability | Probability

This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **basic probability** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

How to use the questions in this resource

There are 20 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **The likelihood of an event happening**, **Complement probabilities**, **Regrouping**, and **Forming and solving equations**.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

Diagnostic Questions: Basic Probability

1. An unbiased coin is flipped five times and each time lands heads up. Choose the word that describes the likelihood of getting Heads when the coin is next flipped:

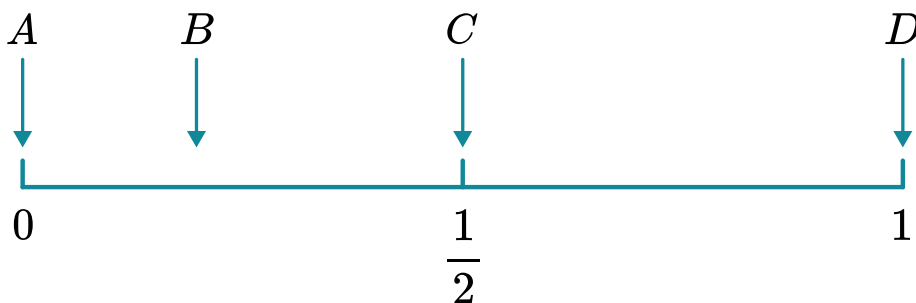
A) Certain	B) Impossible
C) Even chance	D) Likely

2. Choose the word that describes the likelihood that it will snow in the UK on 1st June:

A) Unlikely	B) Impossible
C) Likely	D) Even chance

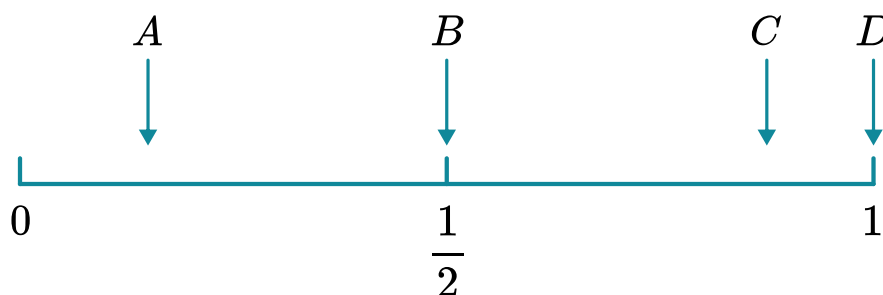
Diagnostic Questions: Basic Probability

3. An unbiased 6-sided dice is rolled. Choose the option that indicates the probability of rolling a 6:



A) A	B) B
C) C	D) D

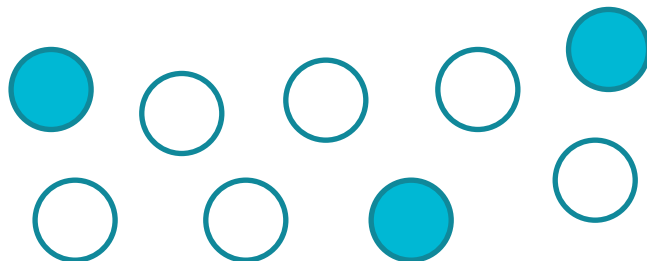
4. A letter is chosen at random from the 26 letter alphabet. Choose the option that indicates the probability of selecting a consonant:



A) A	B) B
C) C	D) D

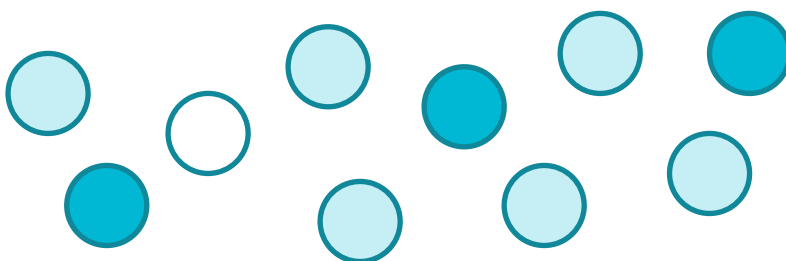
Diagnostic Questions: Basic Probability

5. Some blue and white counters are placed in a bag. A counter is selected at random. Write the probability of selecting a blue counter as a fraction in its simplest form:



A) $\frac{3}{6}$	B) $\frac{3}{9}$
C) $\frac{2}{3}$	D) $\frac{1}{3}$

6. Some counters are placed in a bag, and a counter is selected at random. What is the probability of selecting a light blue counter, as a decimal:



A) 0.5	B) 0.6
C) 0.4	D) $0.\dot{6}$

Diagnostic Questions: Basic Probability

7. For event A , it is known that $P(A) = \frac{3}{4}$. What is $P(\text{not } A)$?

A) $\frac{1}{4}$	B) $\frac{4}{3}$
C) $\frac{3}{4}$	D) $\frac{1}{3}$

8. The probability that the 0817 train from Askington to Birsland sets off on time is 0.92. What is the probability that this train is late setting off?

A) 0.8	B) 0.18
C) 0.08	D) 0.29

9. A bag contains blue, red and green counters. If a counter is drawn at random, the probability of blue is $\frac{7}{12}$ and the probability of red is $\frac{7}{20}$. What is the probability of drawing a green counter?

A) $\frac{1}{16}$	B) $\frac{14}{15}$
C) $\frac{49}{240}$	D) $\frac{1}{15}$

Diagnostic Questions: Basic Probability

10. A bag contains orange, yellow, green and purple counters. When drawn at random, $P(\text{orange}) = 0.1$, $P(\text{yellow}) = 0.15$ and $P(\text{green}) = 0.27$. What is the probability of drawing a purple counter?

A) 0.57	B) 0.48
C) 0.52	D) 0.58

11. There are red, yellow and blue counters in a bag. The probabilities of selecting a counter of each colour are shown below. What is the probability of selecting a blue counter?

Colour	Red	Yellow	Blue
Probability	$2x$	$\frac{1}{4}$	$3x$

A) $\frac{3}{20}$	B) $\frac{6}{20}$
C) $\frac{3}{5}$	D) $\frac{9}{20}$

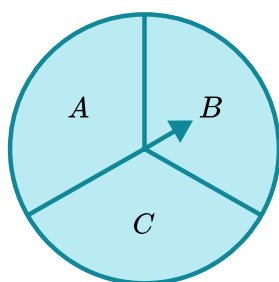
Diagnostic Questions: Basic Probability

12. There are green, lilac, orange and pink counters in a bag. The probabilities of selecting a counter of each colour are shown below. What is the probability of selecting an orange counter?

Colour	Green	Lilac	Orange	Pink
Probability	$5y$	0.38	$3y$	0.3

A) 0.12	B) 0.2
C) 0.04	D) 0.375

13. An experiment is conducted on a spinner, with the results collated. What is the relative frequency of the spinner landing on B?



Result	A	B	C
Frequency	5	9	11

A) 9	B) $\frac{9}{16}$
C) 0.36	D) 45%

Diagnostic Questions: Basic Probability

14. The probability that a biased dice lands on six when rolled is 0.22.
If the dice is rolled 60 times, how many sixes would you expect to get?

A) 22	B) 13
C) 13.2	D) 38

15. An experiment reveals that a biased coin has a $\frac{5}{8}$ probability of landing on heads when flipped. How many heads would be expected from 200 coin flips?

A) 40	B) 125
C) 100	D) 25

16. A fair, 6-sided dice is rolled. What is the probability of scoring a multiple of 2 or a multiple of 3?

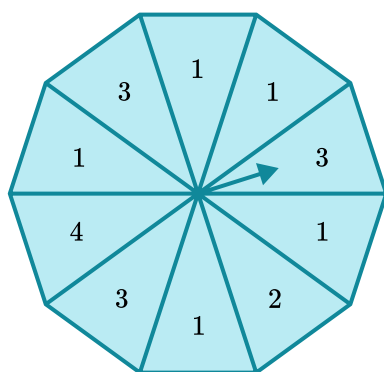
A) $\frac{2}{3}$	B) $\frac{1}{6}$
C) $\frac{5}{6}$	D) $\frac{1}{2}$

Diagnostic Questions: Basic Probability

17. A card is drawn from a standard deck of playing cards.
What is the probability of drawing a card that is red or clubs?

A) 0.5	B) 0.33
C) 0.75	D) 1

18. This spinner is made using a regular polygon.
On a single spin, what is the probability of scoring a 3 or a 4?



A) $\frac{3}{10}$	B) $\frac{3}{100}$
C) $\frac{2}{3}$	D) $\frac{2}{5}$

Diagnostic Questions: Basic Probability

19. A bag contains black, white and grey counters. A counter is drawn at random. The probability of drawing a black counter is $\frac{3}{8}$ and the probabilities of drawing a white or a grey counter are the same.

What is the minimum number of counters the bag contains?

A) 8	B) 16
C) 24	D) 40

20. A bag contains 21 blue counters and some red counters. A counter is drawn at random. Given that the probability of getting a red counter is 0.65, determine how many counters are in the bag.

A) 44	B) 735
C) 60	D) 86

Diagnostic Questions: Basic Probability

1. An unbiased coin is flipped five times and each time lands heads up. Choose the word that describes the likelihood of getting Heads when the coin is next flipped:

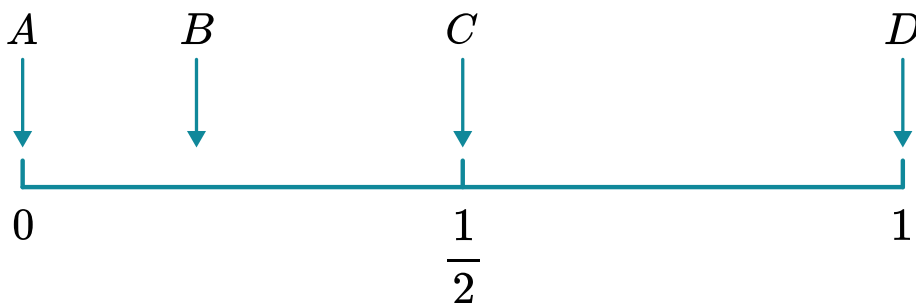
A) Certain Student thinks past results guarantee the next result
B) Impossible Student assumed the result must be about to switch
C) Even chance Correct answer
D) Likely Student assumed past results make the outcome more likely

2. Choose the word that describes the likelihood that it will snow in the UK on 1st June:

A) Unlikely Correct answer
B) Impossible Student confused concepts of unlikely and impossible
C) Likely Student assumed any type of weather is possible
D) Even chance Student does not understand what a 50% chance suggests

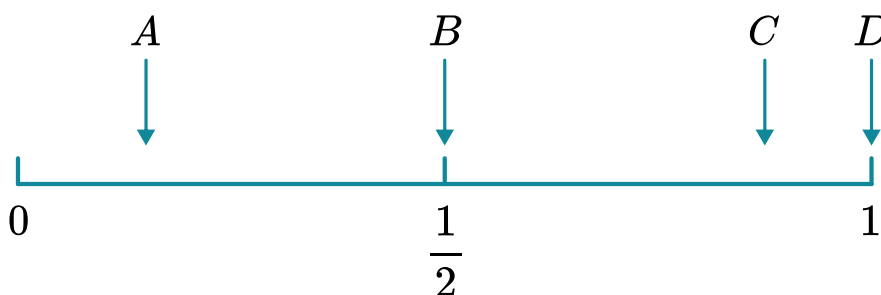
Diagnostic Questions: Basic Probability

3. An unbiased 6-sided dice is rolled. Choose the option that indicates the probability of rolling a 6:



- A) A Student does not understand that the probability of this event must be greater than zero
 B) **B Correct answer**
 C) C Student has not looked at the number of ways the event can happen
 D) D Student has given the probability of any number on a dice being scored

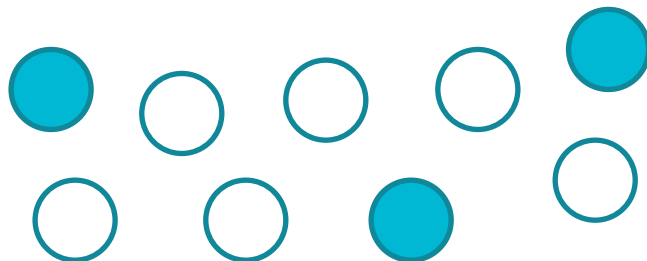
4. A letter is chosen at random from the 26 letter alphabet. Choose the option that indicates the probability of selecting a consonant:



- A) A Student chose the probability of selecting a vowel
 B) B Student assumed the chances of selecting a vowel or a consonant are the same
 C) **C Correct answer**
 D) D Student chose the probability of selecting any letter

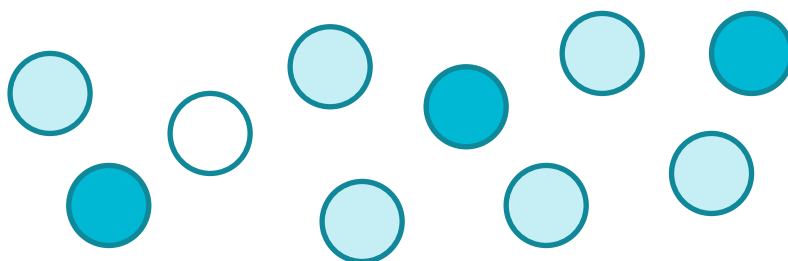
Diagnostic Questions: Basic Probability

5. Some blue and white counters are placed in a bag. A counter is selected at random. Write the probability of selecting a blue counter as a fraction in its simplest form:



- A) $\frac{3}{6}$ Student used number of white counters as the denominator instead of using the total
- B) $\frac{3}{9}$ Student did not simplify the fraction
- C) $\frac{2}{3}$ Student gave the probability of selecting a white counter
- D) $\frac{1}{3}$ Correct answer

6. Some counters are placed in a bag, and a counter is selected at random. What is the probability of selecting a light blue counter, as a decimal:



- A) 0.5 Student miscounted (only including five light blue counters)
- B) 0.6 Correct answer
- C) 0.4 Student gave probability of not selecting a light blue counter
- D) 0.6 Student did not include the white counter in the total

Diagnostic Questions: Basic Probability

7. For event A , it is known that $P(A) = \frac{3}{4}$. What is $P(\text{not } A)$?

- A) $\frac{1}{4}$ Correct answer
- B) $\frac{4}{3}$ Student stated the reciprocal of the probability
- C) $\frac{3}{4}$ Student assumed the probabilities of “ A ” and “not A ” were the same
- D) $\frac{1}{3}$ Student made an error subtracting the probability from 1

8. The probability that the 0817 train from Askington to Birsland sets off on time is 0.92

What is the probability that this train is late setting off?

- A) 0.8 Student made an error subtracting the probability from 1
- B) 0.18 Student made a regrouping error when subtracting
- C) 0.08 Correct answer
- D) 0.29 Student does not understand probability

9. A bag contains blue, red and green counters. If a counter is drawn at random, the probability of blue is $\frac{7}{12}$ and the probability of red is $\frac{7}{20}$. What is the probability of drawing a green counter?

- A) $\frac{1}{16}$ Student made an error in the fraction arithmetic
- B) $\frac{14}{15}$ Student found the sum of known probabilities but forgot to subtract from 1
- C) $\frac{49}{240}$ Student found the product of known probabilities
- D) $\frac{1}{15}$ Correct answer

Diagnostic Questions: Basic Probability

10. A bag contains orange, yellow, green and purple counters. When drawn at random, $P(\text{orange}) = 0.1$, $P(\text{yellow}) = 0.15$ and $P(\text{green}) = 0.27$. What is the probability of drawing a purple counter?

- A) 0.57 Student misaligned place values (using 0.01 in place of 0.1)
 B) 0.48 Correct answer
 C) 0.52 Student found the sum of known probabilities but forgot to subtract from 1
 D) 0.58 Student made an error regrouping when subtracting from 1

11. There are red, yellow and blue counters in a bag. The probabilities of selecting a counter of each colour are shown below. What is the probability of selecting a blue counter?

Colour	Red	Yellow	Blue
Probability	$2x$	$\frac{1}{4}$	$3x$

- A) $\frac{3}{20}$ Student gave the value of x
 B) $\frac{6}{20}$ Student gave the probability of selecting a red counter
 C) $\frac{3}{5}$ Student solved $5x = 1$ instead of $5x = \frac{3}{4}$
 D) $\frac{9}{20}$ Correct answer

Diagnostic Questions: Basic Probability

12. There are green, lilac, orange and pink counters in a bag. The probabilities of selecting a counter of each colour are shown below. What is the probability of selecting an orange counter?

Colour	Green	Lilac	Orange	Pink
Probability	$5y$	0.38	$3y$	0.3

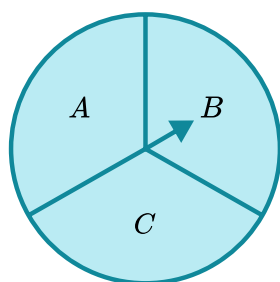
A) 0.12 Correct answer

B) 0.2 Student gave the probability of selecting green

C) 0.04 Student gave the value of y

D) 0.375 Student solved $8y = 1$ instead of $8y = 0.32$

13. An experiment is conducted on a spinner, with the results collated. What is the relative frequency of the spinner landing on B?



Result	A	B	C
Frequency	5	9	11

A) 9 Student stated the number of times the event occurred

B) $\frac{9}{16}$ Student did not use the total number of trials for the denominator

C) 0.36 Correct answer

D) 45% Student used 9 out of 20 (not 25)

Diagnostic Questions: Basic Probability

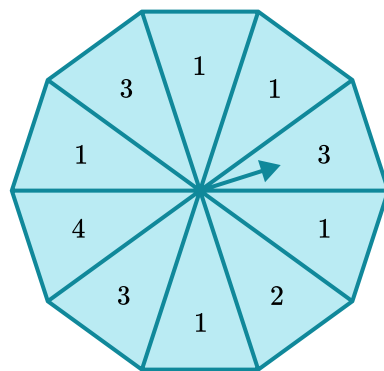
14. The probability that a biased dice lands on six when rolled is 0.22.
If the dice is rolled 60 times, how many sixes would you expect to get?
- A) 22 Student used only the decimal to produce the expected value
B) 13 Correct answer
C) 13.2 Student did not round to obtain an integer
D) 38 Student used the information given incorrectly [60 - 22]
-
15. An experiment reveals that a biased coin has a $\frac{5}{8}$ probability of landing on Heads when flipped. How many heads would be expected from 200 coin flips?
- A) 40 Student divided the number of trials by 5
B) 125 Correct answer
C) 100 Student did not apply the information in the question
D) 25 Student divided by the denominator but forgot to multiply by the numerator
-
16. A fair, 6-sided dice is rolled. What is the probability of scoring a multiple of 2 or a multiple of 3?
- A) $\frac{2}{3}$ Correct answer
B) $\frac{1}{6}$ Student gave the probability of scoring a number that is a multiple of 2 and 3
C) $\frac{5}{6}$ Student counted the occurrence of six twice
D) $\frac{1}{2}$ Student removed the occurrence of six (counting only 2, 3 and 4)

Diagnostic Questions: Basic Probability

17. A card is drawn from a standard deck of playing cards.
What is the probability of drawing a card that is red or clubs?

- A) 0.5 Student only counted one of the red suits
 B) 0.33 Student calculated the probability of drawing clubs from the reds and clubs
 C) 0.75 Correct answer
 D) 1 Student assumed all outcomes were accounted for by the given conditions

18. This spinner is made using a regular polygon.
On a single spin, what is the probability of scoring a 3 or a 4?



- A) $\frac{3}{10}$ Student gave the probability of scoring a 3
 B) $\frac{3}{100}$ Student multiplied probabilities instead of adding
 C) $\frac{2}{3}$ Student had correct numerator but used 6 (being the complement) as the denominator
 D) $\frac{2}{5}$ Correct answer

Diagnostic Questions: Basic Probability Answers

19. A bag contains black, white and grey counters. A counter is drawn at random. The probability of drawing a black counter is $\frac{3}{8}$ and the probabilities of drawing a white or a grey counter are the same.
- What is the minimum number of counters the bag contains?
- A) 8 Student used the denominator from the given probability as the total
 - B) 16 Correct answer
 - C) 24 Student multiplied the denominator of the probability of a black counter by the number of colour choices
 - D) 40 Student assumed all outcomes were accounted for by the given conditions
-
20. A bag contains 21 blue counters and some red counters. A counter is drawn at random. Given that the probability of getting a red counter is 0.65, determine how many counters are in the bag.
- A) 44 Student confused quantities, calculating $65 - 21$
 - B) 735 Student multiplied the number of blue counters by 35
 - C) 60 Correct answer
 - D) 86 Student confused quantities, calculating $65 + 21$

Where to go next?

For more diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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