



THIRD SPACE
LEARNING

Diagnostic Questions

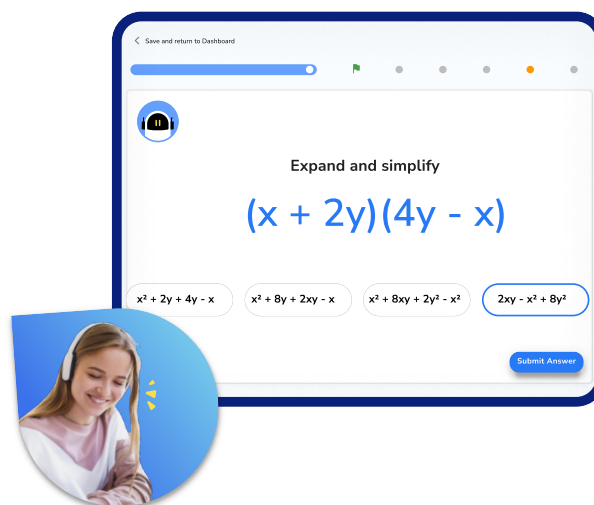
Tree Diagrams | Probability

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 **tree diagrams** 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

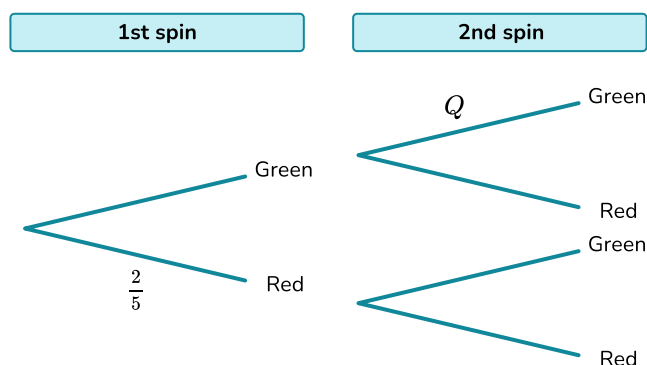
There are 14 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions including: **Confusing multiplication and addition, Multiplying decimals, Mutually exclusive events, and Incorrectly calculated frequencies.**

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.

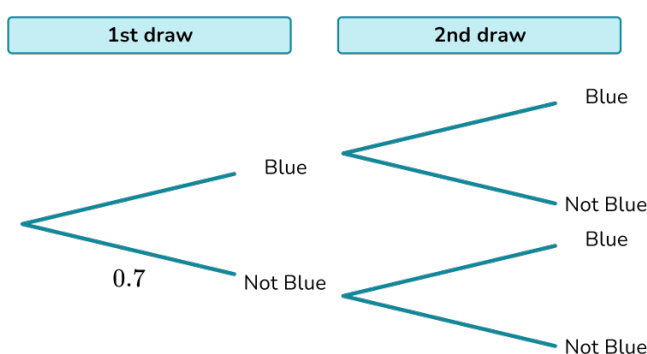
Diagnostic Questions: Tree Diagrams

1. A spinner is spun twice. It can land on Green or Red. What is the value of Q ?



A) $\frac{2}{5}$	B) $\frac{3}{5}$
C) 1	D) $\frac{9}{25}$

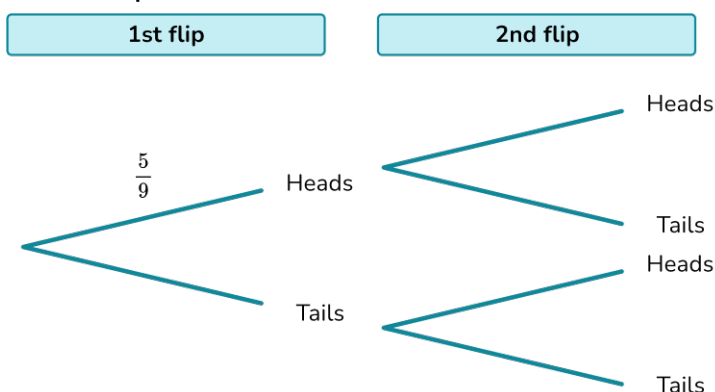
2. A bag contains Blue, Red and Green chips. A chip is drawn at random and replaced, then a second chip is drawn. Determine the probability that a Blue chip is drawn both times:



A) 0.09	B) 0.6
C) 0.49	D) 0.9

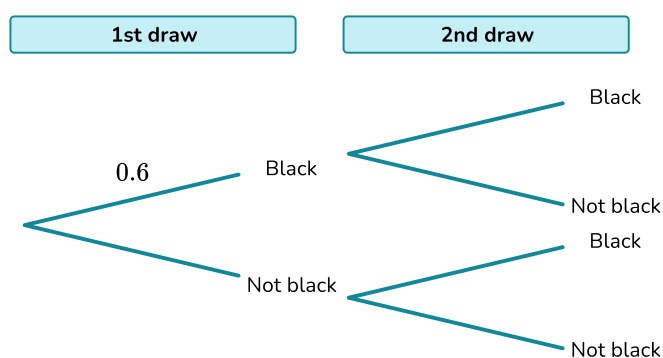
Diagnostic Questions: Tree Diagrams

3. A biased coin is flipped twice. Use the tree diagram to determine the probability of getting tails on both flips:



A) $\frac{8}{9}$	B) $\frac{25}{81}$
C) $\frac{4}{9}$	D) $\frac{16}{81}$

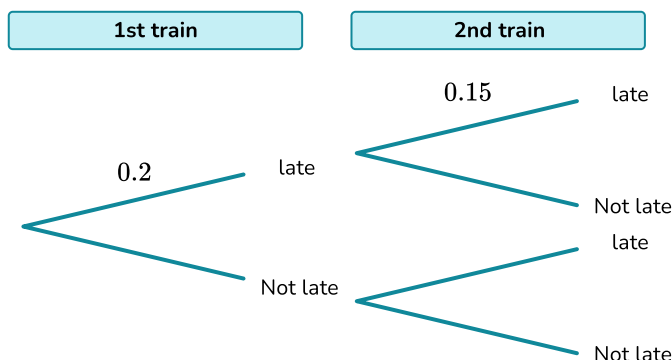
4. A bag contains some Black, Grey and White chips. A chip is drawn at random and replaced, then a second chip is drawn. Determine the probability that a Black chip is drawn only once:



A) 0.48	B) 0.6
C) 0.84	D) 0.5

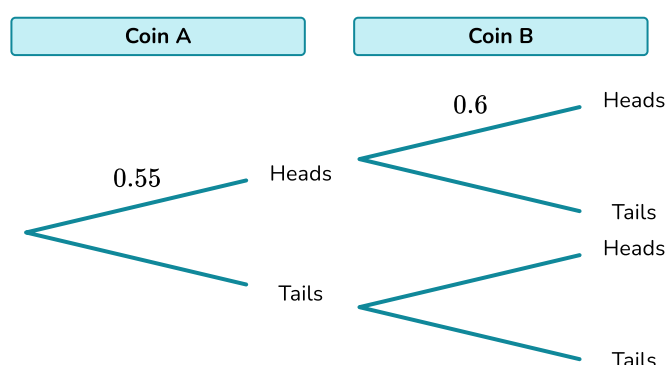
Diagnostic Questions: Tree Diagrams

5. Alex catches two trains to work. The probability that the first train is late is 0.2 and the probability that the second train is late is 0.15. What is the probability that at least one of the trains is late?



A) 0.42	B) 0.29
C) 0.32	D) 0.5

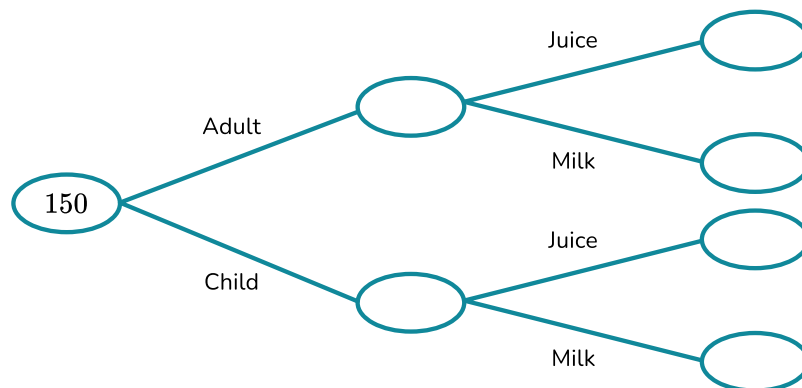
6. Two biased coins are flipped. The probability of getting Heads on Coin A is 0.55, and the probability of getting Heads on Coin B is 0.6. What is the probability of getting the same result on both coins?



A) 0.9775	B) 0.51
C) 0.0594	D) 0.49

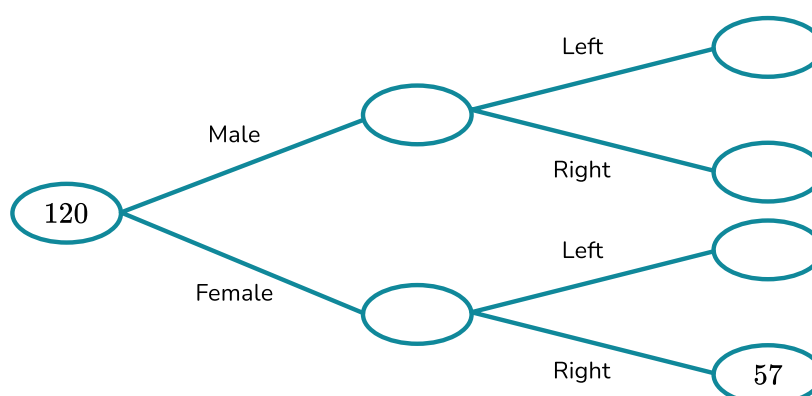
Diagnostic Questions: Tree Diagrams

7. In a survey, 150 participants were asked if they prefer juice or milk. $\frac{2}{5}$ of the participants were adults. 35 children preferred juice. How many children preferred milk?



A) 25	B) 69
C) 46	D) 55

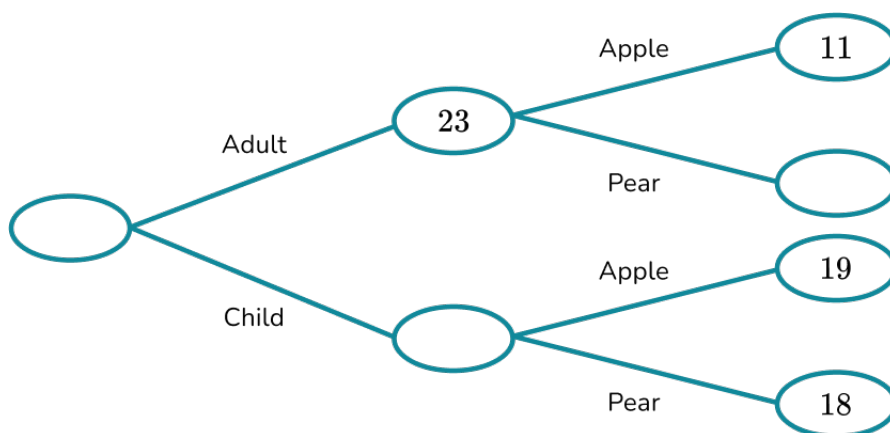
8. In a survey, respondents were asked which was their dominant hand. Given that the ratio of males to females was 1:2, how many left-handed females were surveyed?



A) 23	B) 19
C) 17	D) 3

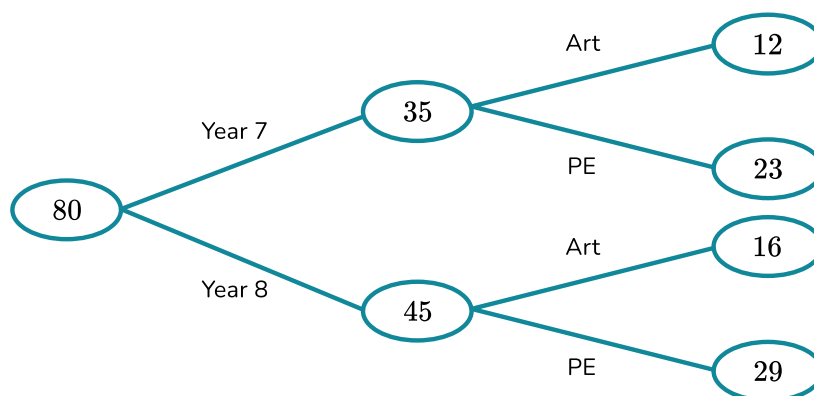
Diagnostic Questions: Tree Diagrams

9. A survey was conducted to ask preference for two types of fruit. Use the frequency tree to work out how many people took part in the survey:



A) 71	B) 60
C) 48	D) 49

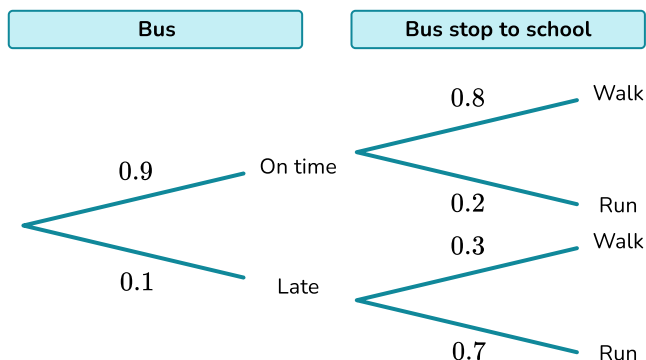
10. Some students are asked if they prefer Art or PE, and the results recorded in a frequency tree. A student is selected at random. What is the probability that they prefer PE?



A) $\frac{29}{37}$	B) $\frac{667}{1575}$
C) $\frac{13}{20}$	D) $\frac{667}{6400}$

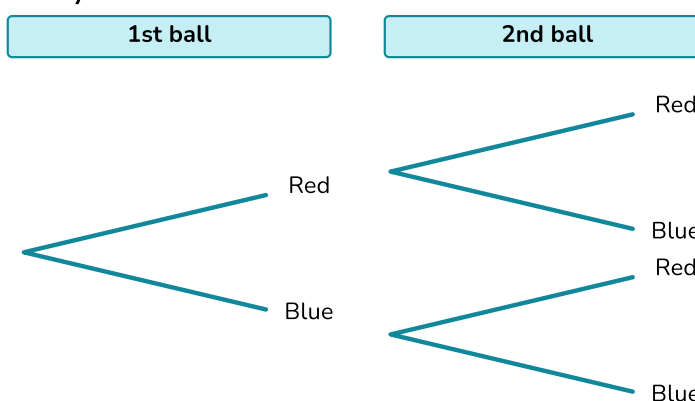
Diagnostic Questions: Tree Diagrams

11. If my bus is on time, there is a 0.2 probability that I run from the bus stop to school. If my bus is late, there is a 0.7 probability that I run from the bus stop to school. Use the tree diagram to find the probability that I walk from the bus stop to school:



A) 0.75	B) 0.55
C) 0.68	D) 0.24

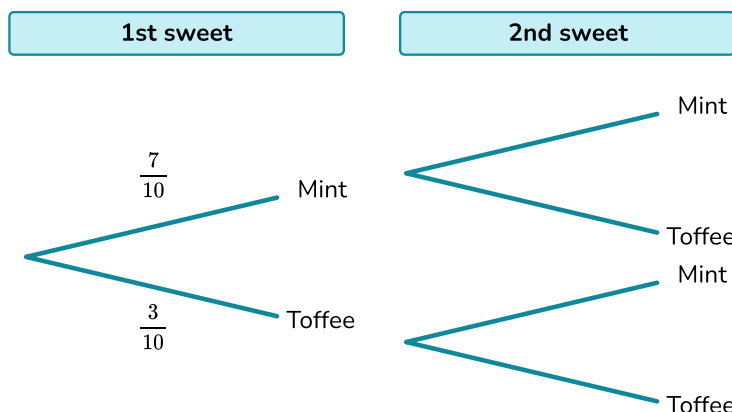
12. There are 2 red balls and 6 blue balls in a bag. A ball is taken at random and placed on a table. A second ball is taken from the bag and placed on the table. What is the probability that the two balls are not the same colour?



A) $\frac{3}{14}$	B) $\frac{3}{8}$
C) $\frac{1}{4}$	D) $\frac{3}{7}$

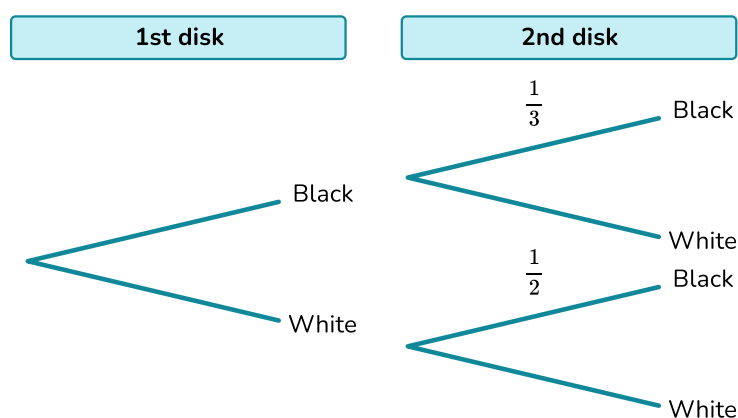
Diagnostic Questions: Tree Diagrams

13. There are 7 mints and 3 toffees in a bag. A sweet is taken at random and eaten. A second sweet is taken. What is the probability that they are the same type of sweet?



A) $\frac{12}{35}$	B) $\frac{8}{15}$
C) $\frac{12}{35}$	D) $\frac{7}{225}$

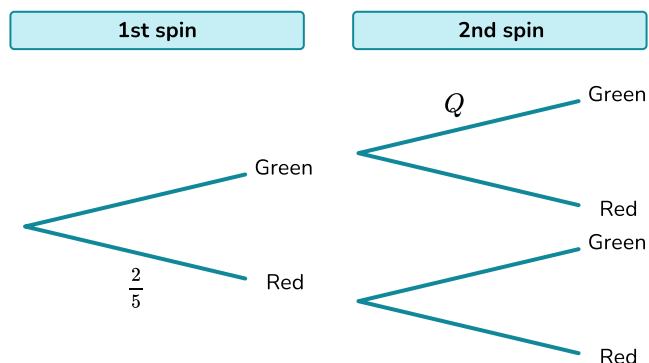
14. A bag contains some Black disks and some White disks. A disk is taken without replacement, then a second disk is taken. Use the tree diagram to determine the probability that both disks are White:



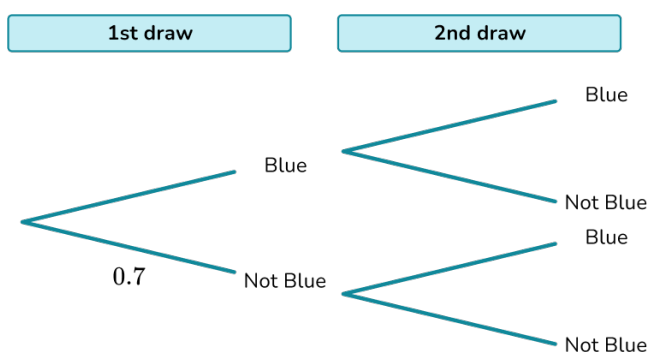
A) $\frac{1}{6}$	B) $\frac{1}{36}$
C) $\frac{2}{7}$	D) $\frac{16}{49}$

Diagnostic Questions: Tree Diagrams Answers

1. A spinner is spun twice. It can land on Green or Red. What is the value of Q ?



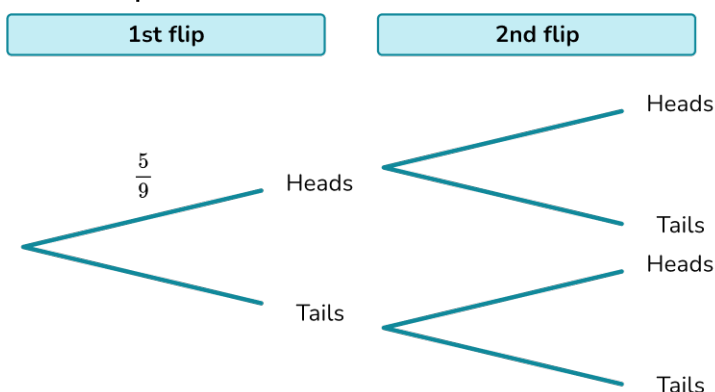
- A) $\frac{2}{5}$ Student does not understand $P(\text{red}) + P(\text{green}) = 1$
- B) $\frac{3}{5}$ Correct answer
- C) 1 Student found the sum of the 1st spin branches for value of the next branch
- D) $\frac{9}{25}$ Student gave the probability of obtaining Green twice
2. A bag contains Blue, Red and Green chips. A chip is drawn at random and replaced, then a second chip is drawn. Determine the probability that a Blue chip is drawn both times.



- A) 0.09 Correct answer
- B) 0.6 Student added probabilities instead of multiplying
- C) 0.49 Student did not subtract 0.7 from 1 to obtain the probability of drawing blue
- D) 0.9 Student made an error multiplying decimal numbers

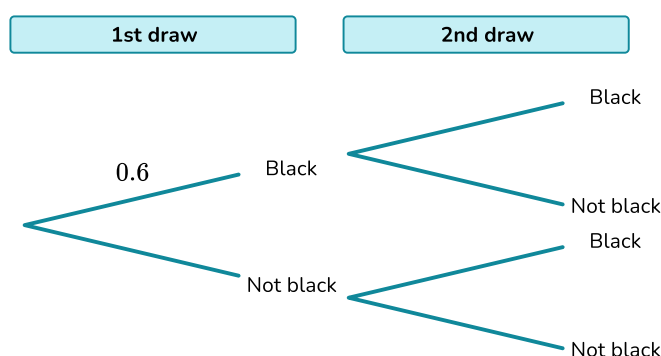
Diagnostic Questions: Tree Diagrams Answers

3. A biased coin is flipped twice. Use the tree diagram to determine the probability of getting tails on both flips:



- A) $\frac{8}{9}$ Student added probabilities instead of multiplying
 B) $\frac{25}{81}$ Student used the probability for Heads (does not understand bias)
 C) $\frac{4}{9}$ Student gave the probability of getting Tails on a single flip
 D) $\frac{16}{81}$ Correct answer

4. A bag contains Black, Grey, and White chips. A chip is drawn at random and replaced, then a second chip is drawn. Determine the probability that a Black chip is drawn only once.

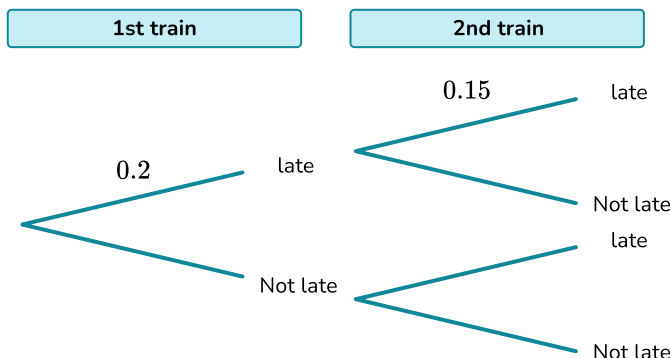


- A) 0.48 Correct answer
 B) 0.6 Student stated the probability of obtaining Black on a single draw
 C) 0.84 Student determined the probability of obtaining Black at least once
 D) 0.5 Student took the (mean) average probability of drawing Black and not drawing Black

Diagnostic Questions: Tree Diagrams Answers

5. Alex catches two trains to work. The probability that the first train is late is 0.2 and the probability that the second train is late is 0.15

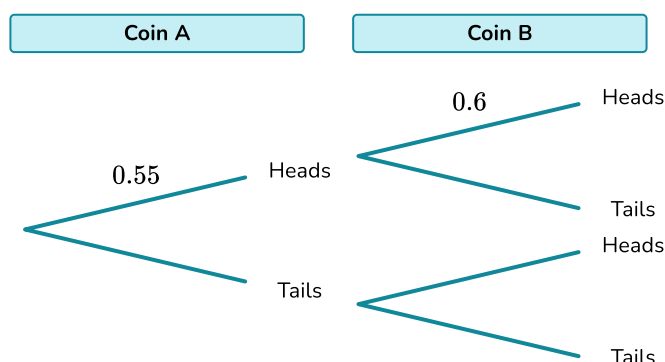
What is the probability that at least one of the trains is late?



- A) 0.42 Student attempted $1 - 0.68$ but made regrouping errors
 B) 0.29 Student determined the probability of only one train being late
 C) 0.32 Correct answer
 D) 0.5 Student found sum of three late sub-branches $(0.2 + 0.15 + 0.15)$

6. Two biased coins are flipped. The probability of getting Heads on Coin A is 0.55, and the probability of getting Heads on Coin B is 0.6.

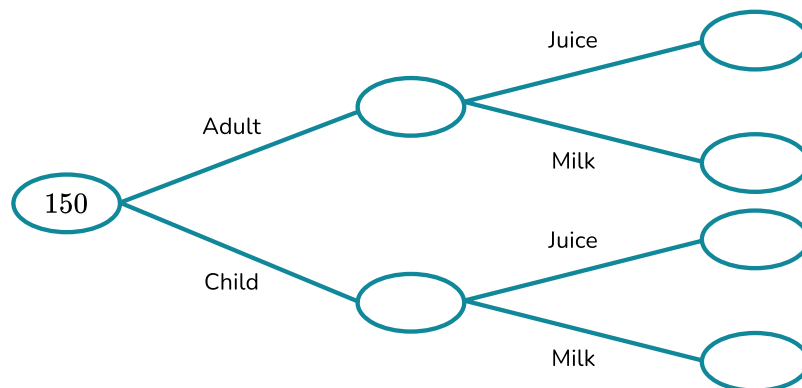
What is the probability of getting the same result on both coins?



- A) 0.9775 Student confused when to add / multiply (1.15×0.85)
 B) 0.51 Correct answer
 C) 0.0594 Student found product instead of the sum of 0.33 and 0.18
 D) 0.49 Student determined the probability of getting different results on the coins

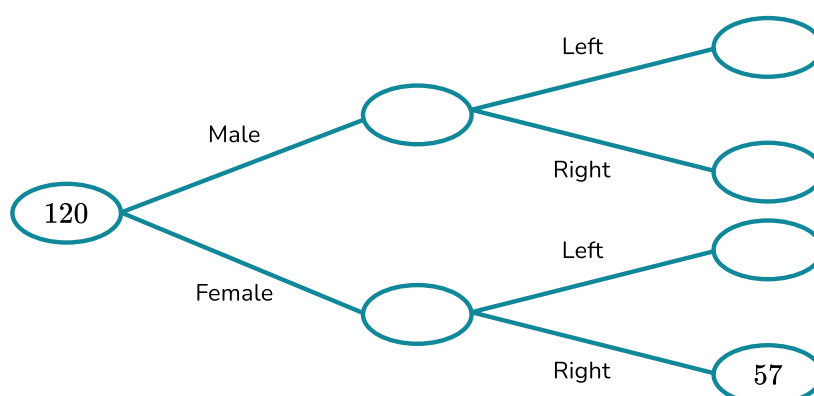
Diagnostic Questions: Tree Diagrams Answers

7. In a survey, 150 participants were asked if they prefer juice or milk. $\frac{2}{5}$ of the participants were adults. 35 children preferred juice. How many children preferred milk?



- A) 25 Student found there to be 60 children (rather than 90)
 B) 69 Student performed operations in wrong order
 C) 46 Student made several errors using the information
 D) 55 Correct answer

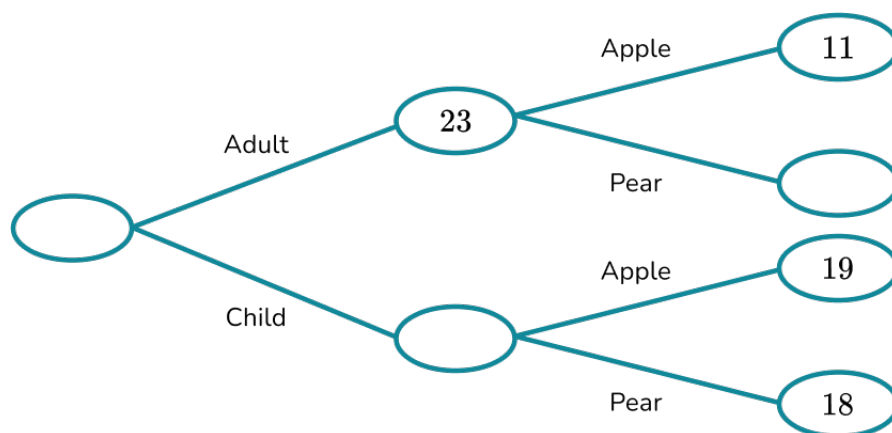
8. In a survey, respondents were asked which was their dominant hand. Given that the ratio of males to females was 1:2, how many left-handed females were surveyed?



- A) 23 Correct answer
 B) 19 Student applied the given ratio to the wrong value
 C) 17 Student used values incorrectly, leading to 57 - 40
 D) 3 Student misunderstood the ratio, finding there to be 60 females

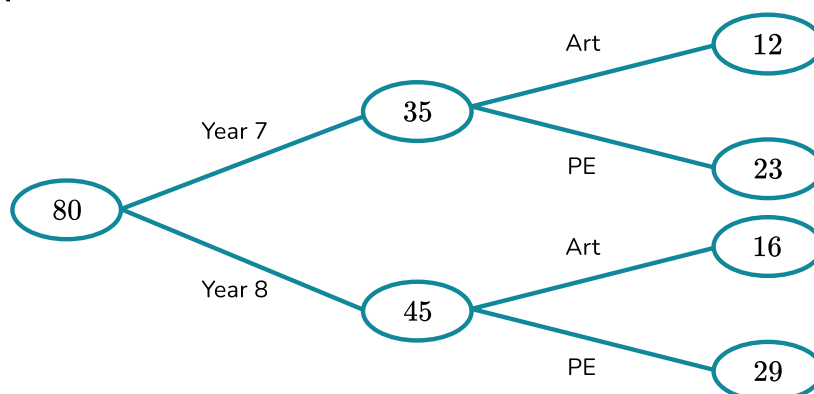
Diagnostic Questions: Tree Diagrams Answers

9. A survey was conducted to ask preference for two types of fruit. Use the frequency tree to work out how many people took part in the survey:



- A) 71 Student found sum of given values
 B) 60 Correct answer
 C) 48 Student did not obtain a missing value to complete calculation
 D) 49 Student used incorrect sequence of operations to combine values

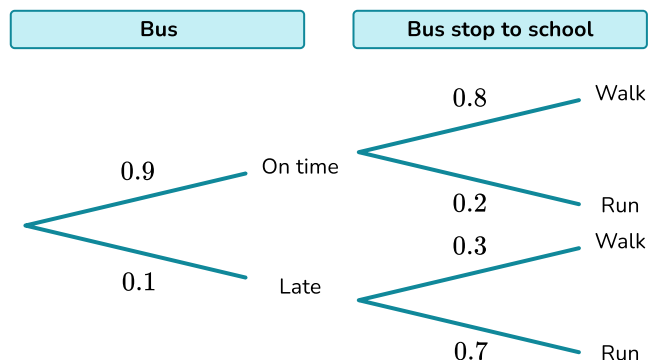
10. Some students are asked if they prefer Art or PE, and the results recorded in a frequency tree. If a student is selected at random, what is the probability that they prefer PE?



- A) $\frac{29}{37}$ Student picked out incorrect values; $(35 + 23)$ and $(45 + 29)$
 B) $\frac{667}{1575}$ Student multiplied proportions preferring PE from Y7 and Y8
 C) $\frac{13}{20}$ Correct answer
 D) $\frac{667}{6400}$ Student found the product instead of the sum when forming the probability

Diagnostic Questions: Tree Diagrams Answers

11. If my bus is on time, there is a 0.2 probability that I run from the bus stop to school. If my bus is late, there is a 0.7 probability that I run from the bus stop to school. Use the tree diagram to find the probability that I walk from the bus stop to school:



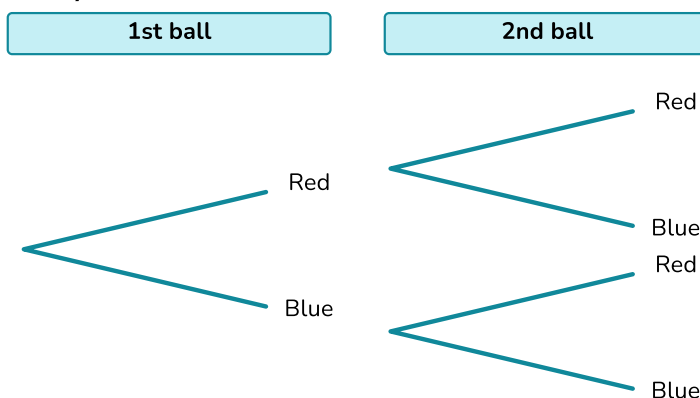
A) 0.75 Correct answer

B) 0.55 Student took the average of 0.8 and 0.3

C) 0.68 Student confused operations along branches $(0.9 + 0.8) \times (0.1 + 0.3)$

D) 0.24 Student multiplied probabilities without conditional understanding

12. There are 2 red balls and 6 blue balls in a bag. A ball is taken at random and placed on a table. A second ball is taken from the bag and placed on the table. What is the probability that the two balls are not the same colour?



A) $\frac{3}{14}$ Student did not include both ways of meeting the criteria

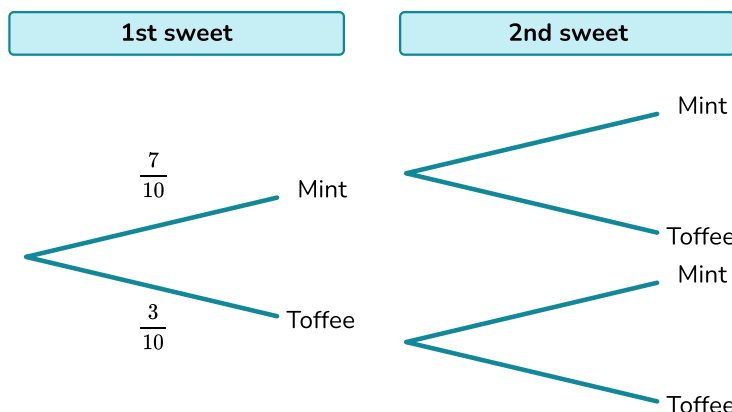
B) $\frac{3}{8}$ Student did not reduce the total number of balls for the 2nd trial

C) $\frac{1}{4}$ Student simplified initial probabilities producing errors

D) $\frac{3}{7}$ Correct answer

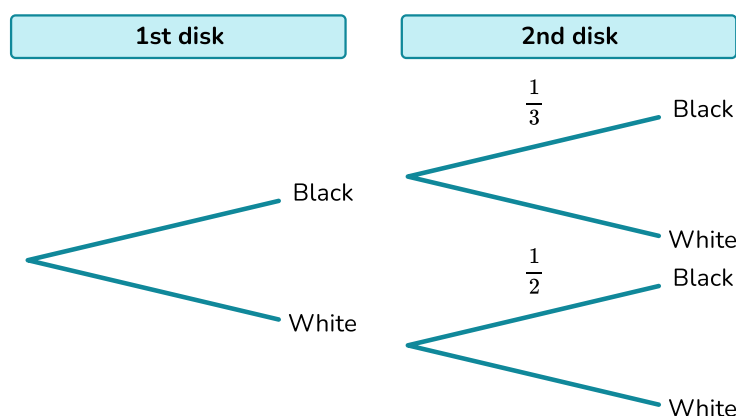
Diagnostic Questions: Tree Diagrams Answers

13. There are 7 mints and 3 toffees in a bag. A sweet is taken at random and eaten. A second sweet is taken. What is the probability that they are the same type of sweet?



- A) $\frac{29}{50}$ Student used the 1st sweet probabilities for the 2nd sweet
 B) $\frac{8}{15}$ **Correct answer**
 C) $\frac{12}{35}$ Student didn't decrease the total number of sweets on second trial
 D) $\frac{7}{225}$ Student found product (not sum) of $P(M/M)$ and $P(T/T)$

14. A bag contains some Black and White disks. A disk is taken without replacement, then a second disk is taken. Use the tree diagram to determine the probability that both disks are White:



- A) $\frac{1}{6}$ Student subtracted the two given probabilities from one
 B) $\frac{1}{36}$ Student subtracted the given probabilities from one then squared
 C) $\frac{2}{7}$ **Correct answer**
 D) $\frac{16}{49}$ Student found initial conditions but misused the probabilities

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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