Foundation Check In - 11.01 Basic probability and experiments

1. A drawing pin is dropped 100 times and lands with its point up 35 times. Estimate the probability that the drawing pin lands with its point up.

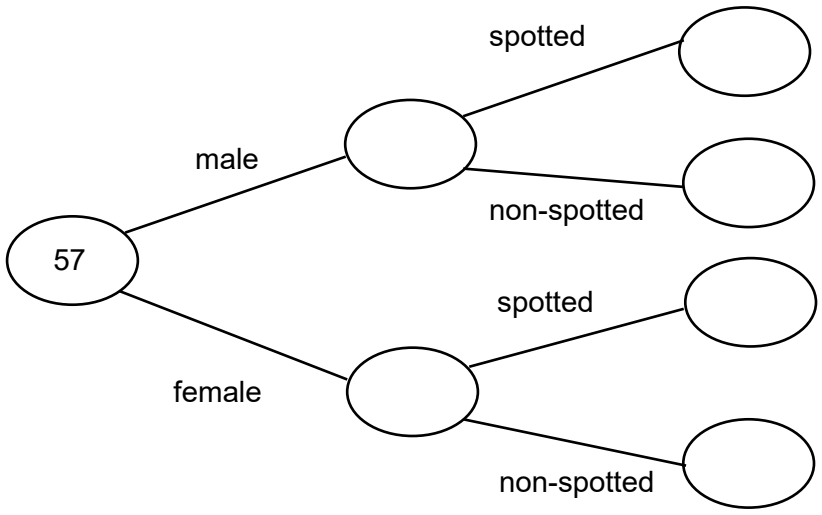
2. A dice is rolled 250 times and lands 85 times on a 1. Estimate the probability that this dice will land on a 1.

3. A group of 50 people are asked if they are left-handed or right-handed. Seven said that they are left-handed. Find the probability that a person chosen at random from this group is right-handed.

4. 500 cars are made in a factory and 15 have defective brakes. Calculate the relative frequency of a car from this factory having defective brakes.

5. Dean estimates that the probability that he will be on time for school is $\frac{4}{5}$. He has based his estimate on 50 days of observations. On how many of these 50 days was Dean late to school?

6. A farmer owns 57 pigs. 12 of the pigs are male. 7 of the male pigs are spotted. 26 of the female pigs are non-spotted. Complete the frequency tree.



7. Light bulbs are tested in a factory. After testing 1000 light bulbs it is found that 925 will last for 1500 hours or more. Show that the relative frequency that a light bulb lasts for less than 1500 hours is 0.075.

8. A group of friends each throw a normal, fair, six-sided dice a number of times. They each note down how many times they roll a 6. Bearing in mind the number of rolls, which friend recorded their results incorrectly? Explain your answer.

	Number of rolls	Number of sixes
Mary	100	19
Jess	500	125
Harvey	10	4
Paul	750	125

9. A group of students complete a maths test that is out of 15. Their results are shown in the table. Find the probability that a student scored 13 or more marks.

Mark	10	11	12	13	14	15
Frequency	3	3	9	16	14	3

10. A kettle company tests samples of their kettles to see how long they last. The company tests 250 kettles and finds that:
    - 100 kettles last for less than 1000 hours
    - 80 kettles last for 1000 to 1500 hours (inclusive)
    - The rest of the kettles last for longer than 1500 hours.

    A warehouse buys 1000 of these kettles. Estimate how many kettles should last for at least 1000 hours.

Extension

2500 volunteers take a flu test to help the medical researchers work out how accurate the test is. 6% of the volunteers have flu, the others do not. The results show that 4% of those that have flu get a negative result on the test and 2% of those that do not have flu get a positive result on the test.

Draw a frequency tree to show the actual results and use it to work out how many people the test diagnoses correctly.

Answers

1. $\frac{35}{100} = \frac{7}{20} (= 0.35)$

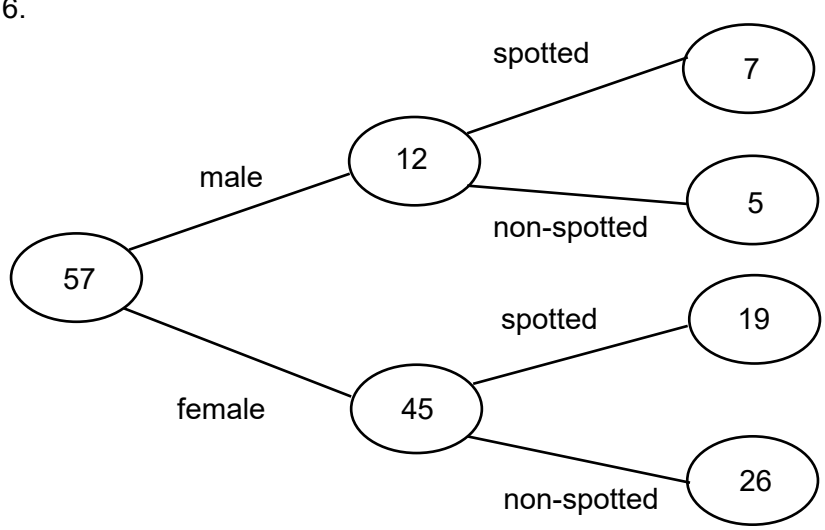
2. $\frac{85}{250} = \frac{17}{50} (= 0.34)$

3. $\frac{43}{50} (= 0.86)$

4. $\frac{15}{500} = \frac{3}{100} (= 0.03)$

5. $\frac{1}{5} \times 50 = 10$ days

6.



7. $\frac{1000 - 925}{1000} = \frac{75}{1000} = \frac{3}{40} (= 0.075)$

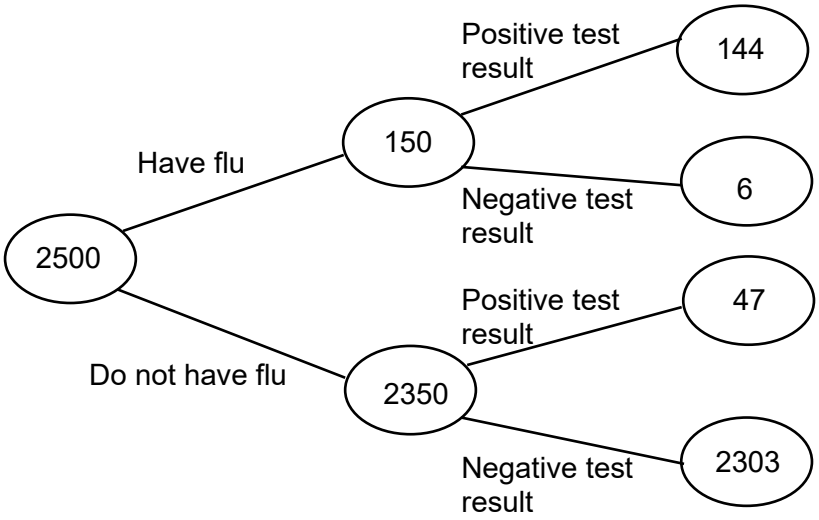
8. We would expect the results to be close to the theoretical probability of 0.17 $\left(\frac{1}{6}\right)$. This is true for Mary (0.19) and Paul (0.17), but not Jess (0.25) or Harvey (0.4). Harvey only rolled the dice 10 times so his relative frequency cannot be expected to be similar to the theoretical probability. Therefore Jess has recorded her results incorrectly as 0.25 is considerably higher than 0.17.

9. $\frac{16 + 14 + 3}{3 + 3 + 9 + 16 + 14 + 3} = \frac{33}{48} (= 0.6875)$

10. 250 – 100 = 150 kettles last for 1000 hours or more, so $\frac{150}{250} = \frac{3}{5} (= 0.6)$

$0.6 \times 1000 = 600$ kettles should last for at least 1000 hours.

Extension



Number of people diagnosed correctly is 2303 + 144 = 2447

GCSE (9–1)

MATHEMATICS

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Estimate a probability			
AO1	2	Estimate a probability			
AO1	3	Find a probability			
AO1	4	Calculate a relative frequency			
AO1	5	Estimate a probability			
AO2	6	Complete a frequency tree			
AO2	7	Calculate a relative frequency			
AO2	8	Understand that relative frequencies approach the theoretical probabilities as the number of trials increases			
AO3	9	Calculate a relative frequency			
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