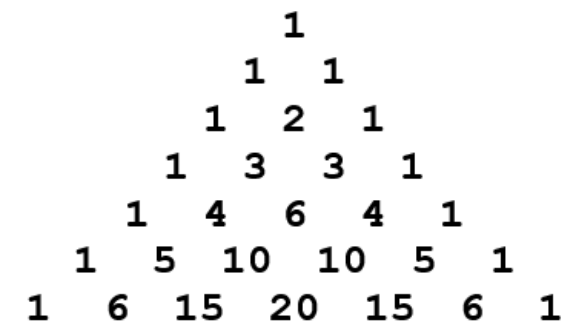
# Advanced Higher Statistics

2020-21

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# Advanced Higher Statistics

- 3 Unit Assessments
- Prelim
- Investigation
- Final Exam Paper 1 - 30 Marks 1 Hour

  Paper 2 - 90 Marks 2 hours 45 mins

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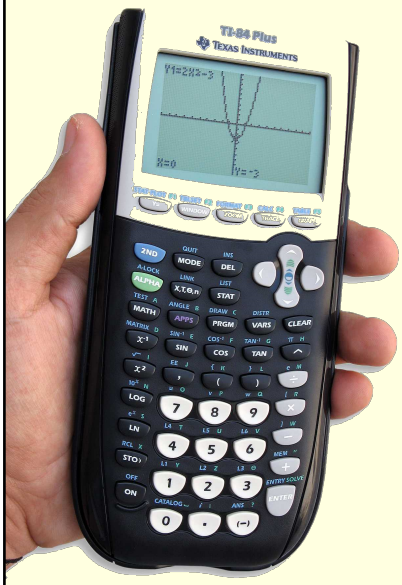
## Advanced Higher Statistics




Handouts

- Data Booklet
- Course Outlines
- Textbooks
- Graphical Calculator

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## Tree Diagrams

**Today we are learning...**

How to calculate probabilities using a tree diagram.

**I will know if I have been successful if...**

I can state what is meant by independent.

I can construct a tree diagram and find a probability.

I know what the "and" rule is.

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# Tree Diagrams

Tree Diagrams - MyMaths Lesson

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# 2019

MARKS

11. There are two available driving instructors at a local driving school and we may assume that learner drivers do not change instructors.

Drivers taught by Instructor A have a 55% chance of passing first time. Of those who do not pass first time, 65% usually go on to pass on their second attempt.

(a) Find the proportion of these drivers who will have passed after one or two attempts. 2

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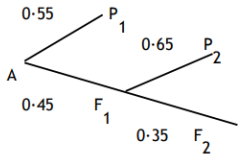
| Question | | | Generic scheme | Illustrative scheme | Max mark |
|---|---|---|---|---|---|
| 11. | (a) | | •[1] appropriate strategy | •[1] tree diagram annotated clearly   | 2 |
| | | | •[2] correct proportion for A | •[2] A: $0\cdot55+0\cdot45(0\cdot65)=0\cdot8425$ | |

## 2018

**2.** A school management team has gathered together information on the percentages of pupils and staff going on school trips, and the percentage of pupils and staff who arrive late for these trips. For one particular trip, of those going 46% were junior pupils, 41% were senior pupils and the rest were staff. It is noted that 9% of those junior pupils, 20% of the senior pupils and 6% of the staff arrived late.

(a) Calculate the probability that a randomly chosen person on this trip:

(i) was a junior pupil who arrived on time

(ii) was late. 3

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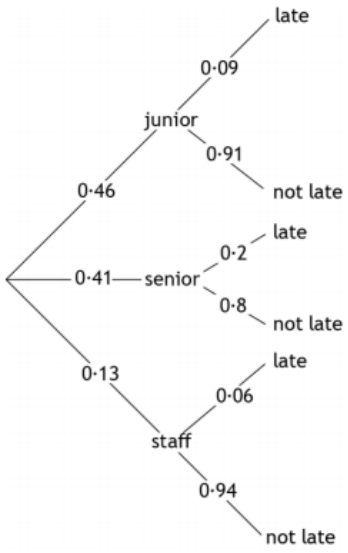
| Question | | | Generic scheme | Illustrative scheme | Max mark |
|---|---|---|---|---|---|
| 2. | (a) | (i) | •1 correct probability | •1 0·4186 | 3 |
| | | (ii) | •2 appropriate strategy | •2   |
| | | | •3 calculate probability | •3 0·1312 | |
| **Notes:** Other methods are acceptable | | | | | |

## 2017

1. A charity in Africa rescues orphaned baby elephants with the aim of returning them to the wild. After it has been rescued, the probability of an orphaned elephant surviving the first month is 0·6. The probability of then reaching adulthood is 0·7. Having reached adulthood, the probability of being returned to the wild is 0·9.

   (a) (i) Calculate the probability that an orphaned elephant is successfully returned to the wild.

   (ii) Calculate the probability that an orphaned elephant reaches adulthood, but is not successfully returned to the wild. 3

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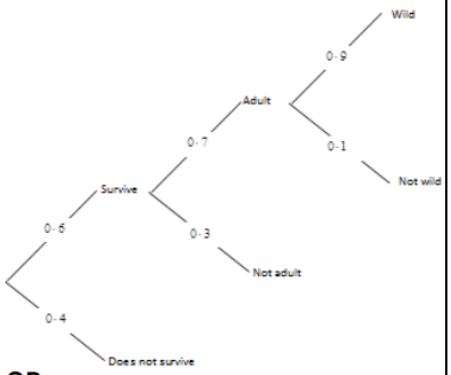
| Question | | | Generic scheme | Illustrative scheme | Max mark |
|---|---|---|---|---|---|
| 1 | (a) | (i) | •1 appropriate strategy | •1   OR $0\cdot6\times0\cdot7\times0\cdot9=$ | 3 |
| | | | •2 correct probability | •2 0·378 | |
| | | (ii) | •3 correct probability | •3 $0\cdot6\times0\cdot7\times0\cdot1=0\cdot042$ | |
| Notes: | | | | | |

2016

MARKS

7. During a viral epidemic a doctor examines 150 people suffering from symptoms commonly associated with the virus. Of the 150 people examined, 90 are male of whom 40 actually have the virus. 10 of the examined females have the virus, the rest do not.

(a) Calculate the probability that an individual selected at random from this group is infected with the virus. 1

(b) If 3 different people are selected at random without replacement from this group, what is the probability that all 3 have the disease? 2

Of the people in this group with the virus 94% react positively to a clinical test to confirm the viral infection, as do 7% of the people without the virus.

(c) (i) Calculate the probability that a person selected at random reacts positively. 4

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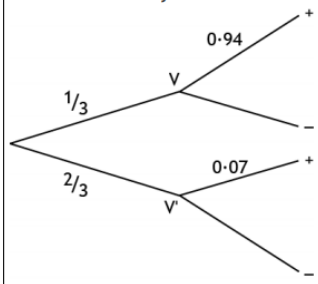
| Question | | | Generic Scheme | Illustrative Scheme | Max Mark |
|---|---|---|---|---|---|
| 7 | (a) | | •1 correct probability | •1 $\frac{1}{3}$ | 1 |
| **Notes:** | | | | | |
| **Commonly Observed Responses:** | | | | | |
| | (b) | | •2 correct probabilities<br>•3 calculate probability | •2 $\frac{50}{150}\times\frac{49}{149}\times\frac{48}{148}$<br>•3 $0{\cdot}0356$ | 2 |
| **Notes:** | | | | | |
| **Commonly Observed Responses:** | | | | | |
| | (c) | (i) | •4 appropriate strategy<br>•5 continue strategy<br><br><br><br><br>•6 complete strategy<br>•7 calculate probability | •4 eg create tree diagram<br>•5 annotate clearly<br>  <br><br>•6 $\frac{1}{3}0{\cdot}94+\frac{2}{3}0{\cdot}07=$<br>•7 $=0{\cdot}36$ | 4 |

## 2019 - Do not do Part a

**2.** A study in which 1000 people were tested for colour blindness also took note of their handedness (left or right). The results are recorded in the contingency table below.

| | | Handedness | |
|---|---|---|---|
| | | Left handed | Right handed |
| Colour blind | No | 130 | 780 |
| | Yes | 10 | 80 |

(a) Given that a person chosen at random is colour blind, calculate the probability that they are left handed. **1**

(b) Use probability theory to determine whether being colour blind is independent of being left handed. **4**

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| | | | | | |
|---|---|---|---|---|---|
| **2.** | (a) | | $\bullet^1$ correct probability | $\bullet^1$ $\frac{1}{9}$ | **1** |
| **Notes:** | | | | | |
| **Commonly Observed Responses:** | | | | | |
| | (b) | | $\bullet^2$ correct strategy<br><br>$\bullet^3$ calculate probability<br><br>$\bullet^4$ appropriate reason<br><br>$\bullet^5$ appropriate conclusion | $\bullet^2$ $P(CB).P(LH)=P(CB\cap LH)$ for independent events<br><br>$\bullet^3$ $\frac{90}{1000}.\frac{140}{1000}=\frac{63}{5000}$<br><br>$\bullet^4$ $\frac{63}{5000}\neq\frac{10}{1000}$<br><br>$\bullet^5$ so we may conclude that being colour blind is not independent of being left handed | **4** |
| **Notes:**<br>One of several alternative methods would be $P(L\|CB)\neq P(L)$: $\frac{1}{9}\neq\frac{140}{1000}$ etc | | | | | |
| **Commonly Observed Responses:** | | | | | |