# Overview of YEAR 13 SPRING STATISTICS

| Week | Statements | Teaching activities | Notes |
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| 1 | 2.03b Be able to use appropriate diagrams to assist in the calculation of probabilities.<br><br>*Includes tree diagrams, sample space diagrams, Venn diagrams.* | | CHAPTER 16 CONDITIONAL PROBABILITY<br><br>SECTION 1 SET NOTATION AND VENN DIAGRAMS Page 356<br><br>EXERCISE 16A Page 360 |
| | 2.03c Understand and be able to use conditional probability, including the use of tree diagrams, Venn diagrams and two-way tables.<br><br>*Includes understanding and being able to use the notations:*<br>$A \cap B$, $A \cup B$, $A \mid B$.<br>*Includes understanding and being able to use the formulae:*<br>$P(A \cap B) = \mathrm{P}(A) \times \mathrm{P}(B \mid A)$,<br>$P(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B)$. | | |
| | 2.03d Understand the concept of conditional probability, and calculate it from first principles in given contexts. | | |

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| | *Includes understanding and being able to use the conditional probability formula* $P(A\|B) = \frac{\mathrm{P}(A \cap B)}{\mathrm{P}(B)}$. *[Use of this formula to find* $P(A\|B)$ *from* $P(B\|A)$ *is excluded.]* | | |

| Week | Statements | Teaching activities | Notes |
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| 2 | | | LESSON 1 CONTINUED<br><br>EXERCISE 16A Page 360 |

| Week | Statements | Teaching activities | Notes |
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| 3 | 2.03c Understand and be able to use conditional probability, including the use of tree diagrams, Venn diagrams and two-way tables.<br><br>*Includes understanding and being able to use the notations:* $A \cap B,\ A \cup B,\ A\|B.$ *Includes understanding and being able to use the formulae:* | | SECTION 2 TWO WAY TABLES Page 363<br><br>EXERCISE 16B Page 364 |

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| | $P(A \cap B) = \mathrm{P}(A) \times \mathrm{P}(B \mid A)$,<br>$P(A \cup B) = \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B)$. | | |

| Week | Statements | Teaching activities | Notes |
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| 4 | 2.03b Be able to use appropriate diagrams to assist in the calculation of probabilities.<br><br>*Includes tree diagrams, sample space diagrams, Venn diagrams.* | | SECTION 3 TREE DIAGRAMS Page 366<br><br>EXERCISE 16C Page 369 |

| Week | Statements | Teaching activities | Notes |
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| 5 | 2.03e Be able to model with probability, including critiquing assumptions made and the likely effect of more realistic assumptions. | | SECTION 4 MODELLING WITH PROBABILITY Page 371<br><br>MIXED PRACTICE 16 Page 375-376 |

| Week | Statements | Teaching activities | Notes |
|---|---|---|---|
| 6 | 2.04e Understand and be able to use the normal distribution as a model. *Includes understanding and being able to use the notation* $X \sim N(\mu, \sigma^2)$. | | CHAPTER 17 THE NORMAL DISTRIBUTION Page 377<br><br>SECTION 1 INTRODUCTION TO NORMAL PROBABILITIES |

| Week | Statements | Teaching activities | Notes |
|---|---|---|---|
| 7 | 2.04e Understand and be able to use the normal distribution as a model. *Includes understanding and being able to use the notation* $X \sim N(\mu, \sigma^2)$. | | SECTION 1 INTRODUCTION TO NORMAL PROBABILITIES CONTINUED<br><br>EXERCISE 17A Page 381 |

| Week | Statements | Teaching activities | Notes |
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| 8 | 2.04f Be able to find probabilities using the normal distribution, using appropriate calculator functions. *This includes finding* $x$*, for a given normal variable, when* $P(X < x)$ *is known.* *Learners should understand the standard normal distribution,* $Z$*, and the transformation* $Z = \frac{X-\mu}{\sigma}$. | | USING Z SCORES AND THE STANDARD NORMAL DISTRIBUTION Page 381 |

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| Week | Statements | Teaching activities | Notes |
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| 9 | 2.04f Be able to find probabilities using the normal distribution, using appropriate calculator functions.<br>*This includes finding $x$, for a given normal variable, when $P(X < x)$ is known.*<br>*Learners should understand the standard normal distribution, $Z$, and the transformation $Z = \frac{X-\mu}{\sigma}$.* | | USING Z SCORES AND THE STANDARD NORMAL DISTRIBUTION CONTINUED Page 381<br><br>EXERCISE 17B Page 384 |

| Week | Statements | Teaching activities | Notes |
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| 10 | 2.04f Be able to find probabilities using the normal distribution, using appropriate calculator functions.<br>*This includes finding $x$, for a given normal variable, when $P(X < x)$ is known.*<br>*Learners should understand the standard normal distribution, $Z$, and the transformation $Z = \frac{X-\mu}{\sigma}$.* | | SECTION 2 INVERSE NORMAL DISTRIBUTION Page 385<br><br>EXERCISE 17C Page 386 |

| Week | Statements | Teaching activities | Notes |
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| 11 | | | SECTION 3 FINDING UNKNOWN PARAMETERS Page 387<br><br>EXERCISE 17D Page 389 |

| Week | Statements | Teaching activities | Notes |
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| 12 | | | SECTION 3 CONTINUED<br><br>EXERCISE 17D Page 389 |

| Week | Statements | Teaching activities | Notes |
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| 13 | 2.04h Be able to select an appropriate probability distribution for a context, with appropriate reasoning, including recognising when the binomial or normal model may not be appropriate.<br><br>*Includes understanding that a given binomial distribution with large n can be approximated by a normal distribution.* | | SECTION 4 MODELLING WITH NORMAL DISTRIBUTION Page 390<br><br>EXERCISE 17E Page 393 |

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| | [*Questions explicitly requiring calculations using the normal approximation to the binomial distribution are excluded.*] | | |

| Week | Statements | Teaching activities | Notes |
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| 14 | | | MIXED PRACTICE 17 Page 396-397 |

| Week | Statements | Teaching activities | Notes |
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| 15 | 2.05d Recognise that a sample mean, $\overline{X}$, can be regarded as a random variable.<br><br>*Learners should know and be able to use the result that if* $X \sim N(\mu, \sigma^2)$ *then* $\overline{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$.<br><br>[*The proof is excluded.*] | | CHAPTER 18 FURTHER HYPOTHESIS TESTING Page 398<br><br>SECTION 1 DISTRIBUTION OF THE SAMPLE MEAN Page 399<br><br>EXERCISE 18A Page 400 |

| Week | Statements | Teaching activities | Notes |
|---|---|---|---|
| 16 | 2.05d Recognise that a sample mean, $\overline{X}$, can be regarded as a random variable.<br><br>*Learners should know and be able to use the result that if* $X \sim N(\mu, \sigma^2)$ *then* $\overline{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$.<br><br>[*The proof is excluded.*] | | SECTION 1 DISTRIBUTION OF THE SAMPLE MEAN Page 399<br><br>EXERCISE 18A CONTINUED Page 400 |

| Week | Statements | Teaching activities | Notes |
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| 17 | 2.05a Understand and be able to use the language of statistical hypothesis testing, developed through a binomial model: null hypothesis, alternative hypothesis, significance level, test statistic, 1-tail test, 2-tail test, critical value, critical region, acceptance region, *p*-value.<br><br>*Hypotheses should be stated in terms of parameter values (where relevant) and the meanings of symbols should be stated. For example, "* $H_0: p = 0.7$, $H_1: p \neq 0.7$, *where* $p$ *is the population proportion in favour of the resolution".* | | SECTION 2 HYPOTHESIS TESTS FOR A MEAN Page 401<br><br>EXERCISE 18B Page 405 |

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| | *Conclusions should be stated in such a way as to reflect the fact that they are not certain. For example, "There is evidence at the 5% level to reject $H_0$. It is likely that the mean mass is less than 500 g."*<br>*"There is no evidence at the 2% level to reject $H_0$. There is no reason to suppose that the mean journey time has changed."*<br><br>*Some examples of incorrect conclusion are as follows:*<br>*"$H_0$ is rejected. Waiting times have increased."*<br>*"Accept $H_0$. Plants in this area have the same height as plants in other areas."* | | |

| Week | Statements | Teaching activities | Notes |
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| 18 | 2.05a Understand and be able to use the language of statistical hypothesis testing, developed through a binomial model: null hypothesis, alternative hypothesis, significance level, test statistic, 1-tail test, 2-tail test, critical value, critical region, acceptance region, *p*-value.<br><br>*Hypotheses should be stated in terms* | | SECTION 2 HYPOTHESIS TESTS FOR A MEAN Page 401<br><br>EXERCISE 18B CONTINUED Page 405 |

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| | *of parameter values (where relevant) and the meanings of symbols should be stated. For example, "* $H_0: p = 0.7$, $H_1: p \neq 0.7$, *where* $p$ *is the population proportion in favour of the resolution".*<br><br>*Conclusions should be stated in such a way as to reflect the fact that they are not certain. For example, "There is evidence at the 5% level to reject* $H_0$*. It is likely that the mean mass is less than 500 g."*<br>*"There is no evidence at the 2% level to reject* $H_0$*. There is no reason to suppose that the mean journey time has changed."*<br><br>*Some examples of incorrect conclusion are as follows:*<br>*"*$H_0$ *is rejected. Waiting times have increased."*<br>*"Accept* $H_0$*. Plants in this area have the same height as plants in other areas."* | | |

| Week | Statements | Teaching activities | Notes |
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| 19 | 2.05f Understand Pearson's product-moment correlation coefficient as a measure of how close data points lie to a straight line. | | SECTION 3 HYPOTHESIS TESTS FOR CORRELATION COEFFICIENTS Page 408<br><br>EXERCISE 18C Page 410 |

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| | 2.05g Use and be able to interpret Pearson's product-moment correlation coefficient in hypothesis tests, using either a given critical value or a *p*-value and a table of critical values.<br><br>*When using Pearson's coefficient in an hypothesis test, the data may be assumed to come from a bivariate normal distribution.*<br><br>*A table of critical values of Pearson's coefficient will be provided.*<br><br>[*Calculation of correlation coefficients is excluded.*] | | |

| Week | Statements | Teaching activities | Notes |
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| 20 | 2.05f Understand Pearson's product-moment correlation coefficient as a measure of how close data points lie to a straight line. | | SECTION 3 HYPOTHESIS TESTS FOR CORRELATION COEFFICIENTS Page 408<br><br>EXERCISE 18C CONTINUED Page 410 |
| | 2.05g Use and be able to interpret Pearson's product-moment correlation | | |

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| | coefficient in hypothesis tests, using either a given critical value or a *p*-value and a table of critical values.<br><br>*When using Pearson's coefficient in an hypothesis test, the data may be assumed to come from a bivariate normal distribution.*<br><br>*A table of critical values of Pearson's coefficient will be provided.*<br><br>[*Calculation of correlation coefficients is excluded.*] | | |

| Week | Statements | Teaching activities | Notes |
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| 21 | | | MIXED PRACTICE 18 Page 413-414 |

| Week | Statements | Teaching activities | Notes |
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| 22 | | | CROSS TOPIC REVIEW Page 420-423 |

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