Knowledge	Skills
Probability	
• Understand and use conditional probability, including the use of tree diagrams, Venn diagrams, two-way tables. Understand and use the conditional probability formula $P(A\|B) = \frac{P(A \cap B)}{P(B)}$ • Modelling with probability, including critiquing assumptions made and the likely effect of more realistic assumptions	• Understanding and use of $P(A') = 1 - P(A)$, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$, $P(A \cap B) = P(A)\,P(B \mid A)$.

Knowledge	Skills
Normal Distribution	
• Understand and use the Normal distribution as a model; find probabilities using the Normal distribution	• The notation $X \sim N(\mu, \sigma 2)$ may be used. Knowledge of the shape and the symmetry of the distribution is required. Knowledge of the probability density function is not required. Derivation of the mean, variance and cumulative distribution function is not required. Questions may involve the solution of simultaneous equations.
• Link to histograms, mean, standard deviation, points of inflection	• Students should know that the points of inflection on the normal curve are at $x = \mu \pm \sigma$
• and the binomial distribution.	• Students should know that when n is large and p is close to 0.5 the distribution B(n, p) can be approximated by N(np, np[1 – p])
• Select an appropriate probability distribution for a context, with appropriate reasoning, including recognising when the binomial or Normal model may not be appropriate.	• Students should know under what conditions a binomial distribution or a Normal distribution might be a suitable model.

Knowledge	Skills
Statistical Distributions	
• Understand and apply the language of statistical hypothesis testing to correlation coefficients as measures of how close data points lie to a straight line.	• Students should know that the product moment correlation coefficient r satisfies $\|r\| \leq 1$ and that a value of $r = \pm 1$ means the data points all lie on a straight line.
• be able to interpret a given correlation coefficient using a given p-value or critical value (calculation of correlation coefficients is excluded).	• Students will be expected to calculate a value of r using their calculator but use of the formula is not required. Hypotheses should be stated in terms of ρ with a null hypothesis of $\rho = 0$ where ρ represents the population correlation coefficient.

Knowledge	Skills
Hypothesis Testing	
• Conduct a statistical hypothesis test for the mean of a Normal distribution with known, given or assumed variance and interpret the results in context.	If $X \sim N(\mu, \sigma^2)$ then $\overline{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$ and that a test for μ can be carried out using: $\frac{\overline{X} - \mu}{\sigma / \sqrt{n}} \sim N(0, 1^2)$. No proofs required. Hypotheses should be stated in terms of the population mean μ.

Belfairs Academy

Mathematics Fundamentals Year 13 – Applied

Mechanics

Knowledge	Skills
Moments	
• Understand and use moments in simple static contexts.	• Equilibrium of rigid bodies. Problems involving parallel and nonparallel coplanar forces, e.g. ladder problems.

Knowledge	Skills
Projectiles	
• Model motion under gravity in a vertical plane using vectors; projectiles.	• Derivation of formulae for time of flight, range and greatest height and the derivation of the equation of the path of a projectile may be required.

Knowledge	Skills
Moments Application of Forces	
• Understand and use Newton's second law for motion in a straight line, extend to situations where forces need to be resolved (restricted to 2 dimensions).	• Extend to problems where forces need to be resolved, e.g. a particle moving on an inclined plane.
• Understand and use Newton's third law; equilibrium of forces on a particle and motion in a straight line resolving forces in 2 dimensions; equilibrium of a particle under coplanar forces.	• Problems may be set where forces need to be resolved, e.g. at least one of the particles is moving on an inclined plane.
• Understand and use addition of forces; resultant forces; dynamics for motion in a plane.	• Students may be required to resolve a vector into two components or use a vector diagram, e.g. problems involving two or more forces, given in magnitudedirection form.
• Understand and use the $F \leq \mu R$ model for friction; coefficient of friction; motion of a body on a rough surface; limiting friction and statics.	• An understanding of $F = \mu R$ when a particle is moving. An understanding of $F \leq \mu R$ in a situation of equilibrium.

Knowledge	Skills
Further Kinematics	
• Understand, use and derive the formulae for constant acceleration for motion in a straight line extending to 2 dimensions using vectors.	• Understand and use suvat formulae for constant acceleration in 2-D, e.g. v = u + at , r = ut + 1 2 2 at with vectors given in i − j or column vector form. Use vectors to solve problems.