Year 13 Further Applied

integral®

FHS

LEARNING JOURNEY













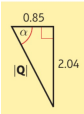
Hooke



5. Elastic collisions in two dimensions

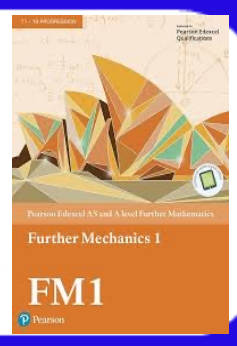
3. Elastic strings and springs

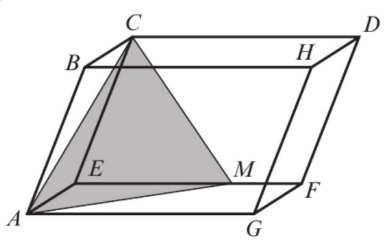
Substitute $m = 0.17$, $\mathbf{u} = 10\mathbf{i} + 5\mathbf{j}$ and $\mathbf{v} = 15\mathbf{i} - 7\mathbf{j}$ into the impulse–momentum equation.



Use Pythagoras' theorem to find the magnitude |**Q**| and trigonometry to find the angle.

1.3 Momentum as a vector





1.Vectors

$z = \sin y \Rightarrow \frac{dz}{dx} = \cos y \frac{dy}{dx}$

and $\frac{d^2z}{dx^2} = \cos y \frac{d^2y}{dx^2} - \sin y \left(\frac{dy}{dx}\right)^2$

Multiplying original differential equation through by $\cos y$ gives

$\cos y \frac{d^2y}{dx^2} - \sin y \left(\frac{dy}{dx}\right)^2 - 2\cos y \frac{dy}{dx} - 3\sin y - \sin x = 0$

This gives

$\frac{d^2z}{dx^2} - 2\frac{dz}{dx} - 3z = \sin x$

The auxiliary equation is $\lambda^2 - 2\lambda - 3 = 0$

$(\lambda + 1)(\lambda - 3) = 0$

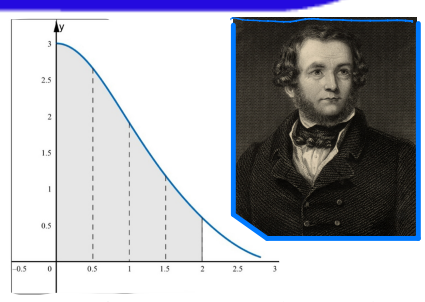
$\lambda = -1$ or 3

So the complementary function is

$z = Ae^{-x} + Be^{3x}$

9. Reducible differential equations





8.3 Simpson's rule

Weierstrass L'Hopital Leibnitz

7. Methods in calculus

5.4 Modelling with trigononmetry



6.Taylor series

Ellipse

3. Conic sections 2

4.3 Modulus Inequalities

L'Hospital's rule states that for two functions $f(x)$ and $g(x)$ if either:

- $\lim_{x \to a} f(x) = \lim_{x \to a} g(x) = 0$, or
- $\lim_{x \to a} f(x) = \pm\infty$ and $\lim_{x \to a} f(x) = \pm\infty$

then provided that $\lim_{x \to a} \frac{f(x)}{g(x)}$ exists, $\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$

Taylor Series Expansion of $Exp\{x\}$

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots$$