# Sample solutions to the 2020 VCAA papers

Specialist Mathematics Examination 1

Question 1 (5 marks)

A 2 kg mass is initially at rest on a smooth horizontal surface. The mass is then acted on by two constant forces that cause the mass to move horizontally. One force has magnitude 10 N and acts in a direction 60° upwards from the horizontal, and the other force has magnitude 5 N and acts in a direction 30° upwards from the horizontal, as shown in the diagram below.
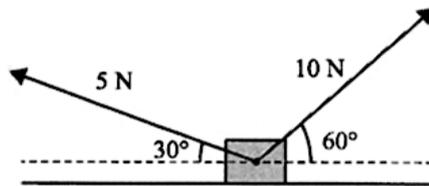
a. Find the normal reaction force, in newtons, that the surface exerts on the mass. **2 marks**

$$R + 10\sin(60°) + 5\sin(30°) - 2g = 0$$
$$R = -5\sqrt{3} - \frac{5}{2} + 2g \quad newtons$$

To order a full copy of these solutions please point your browser to
http://russellboyle.com/orders.html

Mathematical Methods Examination 2

Question 7

If $f(x) = e^{g(x^2)}$, where g is a differentiable function, then $f'(x)$ is equal to

A. $2xe^{g(x^2)}$

B. $2xg(x^2)e^{g(x^2)}$

C. $2xg'(x^2)e^{g(x^2)}$

D. $2xg'(2x)e^{g(x^2)}$

E. $2xg'(x^2)e^{g(2x)}$

$$f'(x) = e^{g(x^2)} \times g'(x^2) \times 2x$$
$$= 2xg'(x^2)e^{g(x^2)}$$

To order a full copy of these solutions please point your browser to
http://russellboyle.com/orders.html

Further Mathematics Examination 1

Question 26

Ray deposited $5000 in an investment account earning interest at the rate of 3% per annum, compounding quarterly.

A rule for the balance, R_n, in dollars, after n years is given by

A. $R_n = 5000 \times 0.03^n$

B. $R_n = 5000 \times 1.03^n$

C. $R_n = 5000 \times 0.03^{4n}$

D. $R_n = 5000 \times 1.0075^n$

E. $R_n = 5000 \times 1.0075^{4n}$

$$R_n = 5000 \times \left(1 + \frac{3}{400}\right)^{n \times 4} = 5000 \times 1.0075^{4n}$$

To order a full copy of these solutions please point your browser to
http://russellboyle.com/orders.html