Higher Maths
Unit 3 Specimen NAB
Number 1

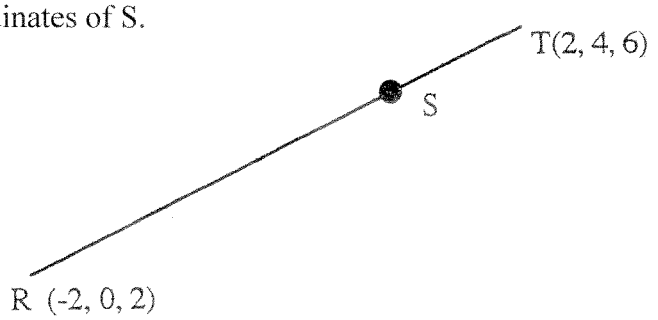
Outcome 1

1. The points P, Q, and R have coordinates (4, 7, 1) , (3, 2, -1) , (5, 12, 3) respectively.

   (a) Write down the components of $\overrightarrow{PR}$ 1

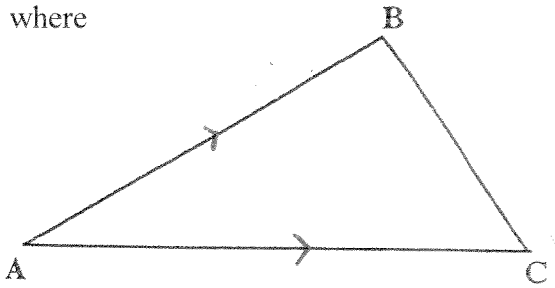
   (b) Hence show that the points P, Q, ans R are collinear. 3

2. The point S divides $\overrightarrow{RT}$ in the ratio 3:1, as shown in the diagram. Find the coordinates of S. 3



3. The diagram shows vectors $\overrightarrow{AB}$ and $\overrightarrow{AC}$ where

$$\overrightarrow{AB} = \begin{pmatrix} 13 \\ 4 \\ 15 \end{pmatrix} \quad \text{and} \quad \overrightarrow{AC} = \begin{pmatrix} 6 \\ -3 \\ 12 \end{pmatrix}$$



   (a) Find the value of $\overrightarrow{AB} \bullet \overrightarrow{AC}$ 1

   (b) Hence find the size of angle BAC. 4

Outcome 2

4. (a) Given $y = \frac{1}{4}\sin x$, find $\frac{dy}{dx}$. 1

(b) Differentiate -4cosx, with respect to x. 1

5. Given $f(x) = (3x+2)^4$ find $f'(x)$. 2

6. (i) Find $\int 3\sin x dx$.

(ii) Integrate $-\frac{1}{4}\cos x$, with respect to x. 3

7. Evaluate $\int_2^6 (x-3)^2 dx$ 4

Outcome 3

8. (a) Simplify $\log_a 4 + \log_a 2$ 1

(b) Simplify $5\log_4 2 + \log_4 2$ 4

9. Solve $e^x = 3.8$ 2

10. Solve $\log_2(x-3) = 4$ 2

Outcome 4

11. Express $3\cos x^0 + 4\sin x^0$ in the form $k\cos(x-\alpha)^0$ where $k > 0$ and $0 \le \alpha < 360$. 5