## Outcome 1

1.  The points P, Q and R have coordinates (1, 3, -4), (5, 6, -3) and (13, 12, -1) respectively.

    (i) Write down the components of $\overrightarrow{PR}$ .                                    **1**
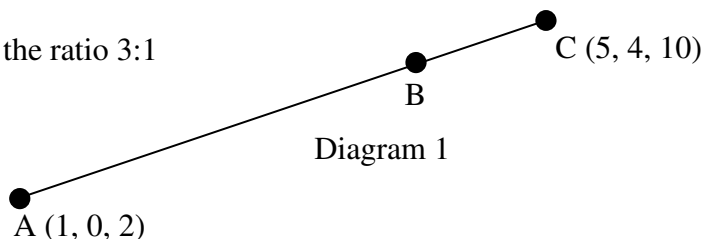
    (ii) Hence show that P, Q and R are collinear.                                              **3**

2   The point B divides $\overrightarrow{AC}$ in the ratio 3:1 as shown in diagram 1.

    C (5, 4, 10)

    B

    Find the coordinates of B.                    Diagram 1                                      **3**
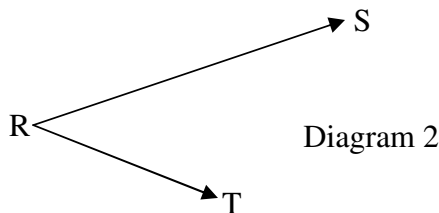
    A (1, 0, 2)

3   Diagram 2 shows vectors $\overrightarrow{RS}$ and $\overrightarrow{ST}$ where

    $\overrightarrow{RS} = \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix}$ and $\overrightarrow{ST} = \begin{pmatrix} -1 \\ 3 \\ 2 \end{pmatrix}$.

    S

    R                    Diagram 2

    (*a*)  Find the value of $\overrightarrow{RS} \; \overrightarrow{ST}$.                        **1**

    T

    (*b*)  Hence find the size of angle TRS.                                                     **4**

## Outcome 2

4       (a)  Given $y = \dfrac{1}{5}\sin x$, find $\dfrac{dy}{dx}$.                               **1**

        (b)  Differentiate $-6\cos x$, with respect to *x*.                                      **1**

5       Given $f(x) = (5x+6)^{-2}$ find $f'(x)$.                                                 **2**

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

        (ii)  Integrate $-\dfrac{3}{5}\cos x$, with respect to *x*.                              **3**

7       Evaluate $\int_{-1}^{2}(x+2)^{3} dx$.                                                    **4**

## Outcome 3

8      (a)      Simplify $\log_a 8 - \log_a 2$.                                    **1**

       (b)      Simplify $3\log_4 2 + \log_4 8$.                                   **4**

9      Solve $e^x = 6.2$                                                          **2**

10     Solve $\log_5(x + 3) = 2$                                                  **2**

## Outcome 4

11     Express $2\sin x° - 4\cos x°$ in the form $k\sin(x - a)°$ where $k > 0$     **5**
       and $0 \leq a \leq 360$.

**End of assessment**