

Unit 3 Practice Assessment

Please read the following instructions

Try and keep within the allocated time limit of **45 minutes**

To pass the assessment, you must pass each of the outcomes

Each outcome has a minimum threshold you must reach to pass

The thresholds for unit 3 are

| | Vectors | | Further Diffn & Integration | | Logs & Exponentials | | The Wave Function | |
|-----------|---------|--------|--------------------------------|--------|------------------------|--------|----------------------|--------|
| | test | retest | test | retest | test | retest | test | retest |
| threshold | 9 | 9 | 8 | 8 | 5 | 5 | 3 | 3 |
| maximum | 12 | 12 | 11 | 11 | 8 | 8 | 5 | 5 |

Note that you are allowed one retest of the outcome(s) you failed. (It is only in exception circumstances that a candidate is allowed a second retest – so please ensure you pass first time round!)

Outcome 1

1a. A, B, and C have coordinates (6, 1, -3), (5, 0, -2) and (2, -3, 1).

(i) Write down the components of \overrightarrow{AB} (1)

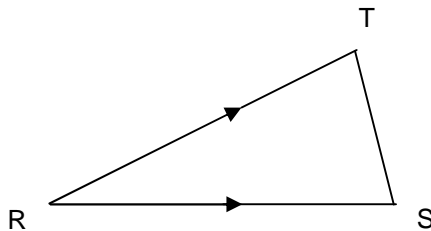
(ii) Show that the points A, B and C are collinear. (3)

b. The point E divides the line DF in the ratio 1:3 as shown in the diagram. Find the coordinates of E. (3)

D(5, 2, 1) E F((9, 10, 13)

2. The diagram shows the triangle where

$$\overrightarrow{RS} = \begin{pmatrix} 2 \\ 3 \\ -2 \end{pmatrix} \quad \overrightarrow{RT} = \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix}$$



a) Find the value of $\overrightarrow{RS} \cdot \overrightarrow{RT}$ (1)

b) Use the result of a) to calculate the size of angle TRS. (4)

Outcome 2

3. a) Differentiate $-5\cos(x)$ with respect to x (1)

b) Given that $y = \frac{1}{3}\sin(x)$ find $\frac{dy}{dx}$ (1)

4. Find $f'(x)$ when $f(x) = (x + 7)^{-4}$ (2)

5. a) Find $\int 5 \sin(x) dx$ (2)

b) Integrate $-\frac{2}{3} \cos(x)$ with respect to x (1)

c) Evaluate $\int_1^2 (x+1)^3 dx$ (4)

Outcome 3

6. a) Simplify $\log_b 10 + \log_b 3$ (1)

b) Simplify $6 \log_4 2 - \log_4 8$ (4)

7. a) If $x = \frac{\log_e 11}{\log_e 6}$ find an approximation for x (1)

b) Given that $\log_{10} x = 4.9$ write down an expression for the exact value of x . (1)

c) If $y = 10^{3.7}$ find an approximation for y (1)

Outcome 4

8. Express $4\cos(x)^\circ + 5\sin(x)^\circ$ in the form $k\cos(x - a)^\circ$ where $k > 0$ and $0 < a < 360^\circ$ (5)