1. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

An arithmetic series has first term a and common difference d.

Given that the sum of the first 9 terms is 54

(a) show that

$$a + 4d = 6$$

(2)

Given also that the 8th term is half the 7th term,

(b) find the values of a and d.

(4)

(Total for Question 1 is 6 marks)

---

2. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

A sequence is defined by

$$u_1 = 3$$

$$u_{n+1} = 2 - \frac{4}{u_n} \quad n \geqslant 1$$

Find the exact values of

(a) u_2, u_3 and u_4

(3)

(b) u_{61}

(1)

(c) $\sum_{i=1}^{99} u_i$

(2)

(Total for Question 2 is 6 marks)

3.

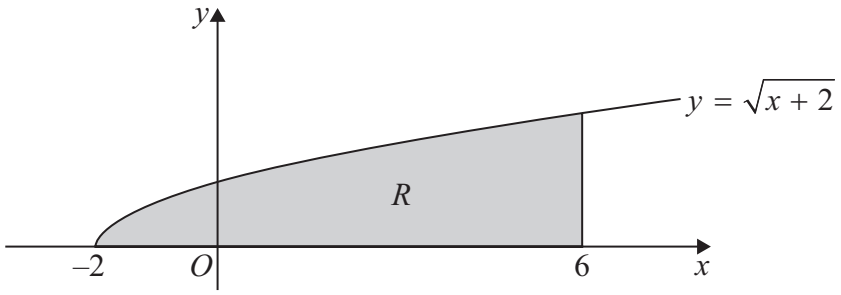


Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = \sqrt{x+2}$ $x \geqslant -2$

The finite region R, shown shaded in Figure 1, is bounded by the curve, the x-axis and the line with equation $x = 6$

The table below shows corresponding values of x and y for $y = \sqrt{x+2}$

x	–2	0	2	4	6
y	0	1.4142	2	2.4495	2.8284

(a) Use the trapezium rule, with all of the values of y in the completed table, to find an approximate value for the area of R, giving your answer to 3 decimal places.

(3)

Use your answer to part (a) to find the approximate value of

(b) $\displaystyle\int_{-2}^{6} (2x + \sqrt{4x+8})\,\mathrm{d}x$

(3)

(Total for Question 3 is 6 marks)