Answer all TEN questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $f(x) = x^3 - 7x + 6$

(a) Show that $(x - 2)$ is a factor of $f(x)$

(2)

(b) Hence, or otherwise, factorise $f(x)$ completely.

(3)

Question 1 continued

(Total for Question 1 is 5 marks)

2 (a) Expand $\left(1+3x^2\right)^{-\frac{1}{3}}$, $3x^2 < 1$, in ascending powers of x, up to and including the term in x^6, simplifying each term as far as possible.

(3)

$$\mathrm{f}(x) = \frac{1-kx^2}{(1+3x^2)^{\frac{1}{3}}} \text{ where } k \text{ is a constant}$$

(b) Obtain a series expansion for $\mathrm{f}(x)$ in ascending powers of x up to and including the term in x^4.

(3)

Given that the coefficient of x^2 in the expansion of $\mathrm{f}(x)$ is -5

(c) find the value of k.

(1)

Question 2 continued

(Total for Question 2 is 7 marks)

3 A right pyramid *ABCDE* has a square base *ABCD* of side 10 cm.
The height of the pyramid is 8 cm.

(a) Find, to 3 significant figures, the length of *AE*.

(3)

(b) Find, in degrees to the nearest degree, the size of the angle between the plane *ABE* and the base *ABCD*.

(3)

Question 3 continued

(Total for Question 3 is 6 marks)