# 1.8 Use of technology to solve systems of linear equations and polynomial equations\_P\_2

**1a.** *[1 mark]*

On her first day in a hospital, Kiri receives  milligrams (mg) of a therapeutic drug. The amount of the drug Kiri receives increases by the same amount, , each day. On the seventh day, she receives 21 mg of the drug, and on the eleventh day she receives 29 mg.

Write down an equation, in terms of  and , for the amount of the drug that she receives on the seventh day.



**1b.** *[1 mark]*

Write down an equation, in terms of  and , for the amount of the drug that she receives on the eleventh day.



**1c.** *[2 marks]*

Write down the value of  and the value of .



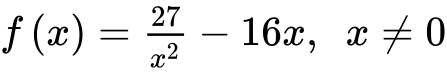
**1d.** *[3 marks]*

Kiri receives the drug for 30 days.

Calculate the total amount of the drug, in mg, that she receives.



**2a.** *[4 marks]*

Consider the function .

Sketch the graph of *y* = *f*(*x*), for −4 ≤ *x* ≤ 3 and −50 ≤ *y* ≤ 100.



**2b.** *[1 mark]*

Use your graphic display calculator to find the zero of *f*(*x*).



**2c.** *[2 marks]*

Use your graphic display calculator to find the coordinates of the local minimum point.



**2d.** *[2 marks]*

Use your graphic display calculator to find the equation of the tangent to the graph of *y* = *f*(*x*) at the point (–2, 38.75).

Give your answer in the form *y* = *mx* + *c*.



**2e.** *[2 marks]*

Sketch the graph of the function *g*(*x*) = 10*x* + 40 on the same axes.

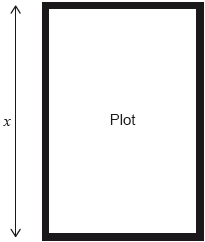
**2f.** *[2 marks]*

Solve the equation*f*(*x*) = *g*(*x*).



**3a.** *[1 mark]*

Violeta plans to grow flowers in a rectangular plot. She places a fence to mark out the perimeter of the plot and uses 200 metres of fence. The length of the plot is  metres.



Show that the width of the plot, in metres, is given by .



**3b.** *[1 mark]*

Write down the area of the plot in terms of .



**4.** *[6 marks]*

Two distinct roots for the equation  are  and  where .

Find the value of  and the value of .



**5.** *[4 marks]*

One root of the equation  is  where . Find the value of  and the value of .

**6a.** *[7 marks]*

Consider .

Use mathematical induction to prove that .

**6b.** *[4 marks]*

Given  and ,

(i)     express  and  in modulus-argument form;

(ii)     hence find .

**6c.** *[1 mark]*

The complex numbers and  are represented by point A and point B respectively on an Argand diagram.

Plot point A and point B on the Argand diagram.

**6d.** *[3 marks]*

Point A is rotated through  in the anticlockwise direction about the origin O to become point . Point B is rotated through  in the clockwise direction about O to become point .

Find the area of triangle O.

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