# 1.8 Use of technology to solve systems of linear equations and polynomial equations\_P\_1

**1a.** *[2 marks]*

Consider the numbers  and .

Calculate . Give your full calculator display.



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

Write down your answer to part (a) correct to two decimal places;



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

Write down your answer to part (a) correct to three significant figures.



**1d.** *[2 marks]*

Write your answer to **part (b)(ii)** in the form , where .



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

The golden ratio,  , was considered by the Ancient Greeks to be the perfect ratio between the lengths of two adjacent sides of a rectangle. The exact value of  is .

Write down the value of 

i)     correct to  significant figures;

ii)    correct to  decimal places.



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

Phidias is designing rectangular windows with adjacent sides of length  metres and  metres. The area of each window is .

Write down an equation to describe this information.



**2c.** *[1 mark]*

Phidias designs the windows so that the ratio between the longer side,  , and the shorter side,  , is the golden ratio, .

Write down an equation in  ,  and  to describe this information.

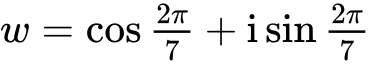


**2d.** *[2 marks]*

Find the value of  .



**3a.** *[3 marks]*

Let .

Verify that  is a root of the equation .



**3b.** *[3 marks]*

(i)     Expand .

(ii)     Hence deduce that .



**3c.** *[3 marks]*

Write down the roots of the equation  in terms of  and plot these roots on an Argand diagram.



**3d.** *[10 marks]*

Consider the quadratic equation  where . The roots of this equation are  and  where  is the complex conjugate of .

(i)     Given that , show that .

(ii)     Find the value of  and the value of .



**4a.** *[1 mark]*

An iron bar is heated. Its length, , in millimetres can be modelled by a linear function, , where  is the temperature measured in degrees Celsius (°C).

At 210°C the length of the iron bar is 181.5 mm.

Write down an equation that shows this second piece of information.



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

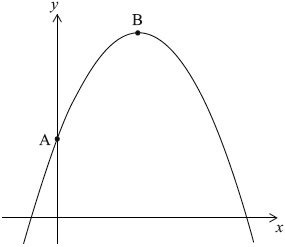
At 210°C the length of the iron bar is 181.5 mm.

Hence, find the length of the iron bar at 40°C.



**5a.** *[1 mark]*

The graph of the quadratic function  intersects the *y*-axis at point A (0, 5) and has its vertex at point B (4, 13).



Write down the value of .

**5b.** *[3 marks]*

By using the coordinates of the vertex, B, or otherwise, write down **two** equations in  and .

**5c.** *[2 marks]*

Find the value of  and of .

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