# Higher Check In - 6.03 Algebraic equations

1. The graph shows the curve .

Use the graph to find the approximate

roots of .

1. Solve these simultaneous equations algebraically.



1. Solve .
2. Solve .
3. Solve .
4. The graph below shows the curve  and the line .

Tom says, “The simultaneous solutions for these graphs are .”

Explain why he must be wrong.

1. Show that the equation  has an approximate solution between  and , giving your answer correct to 2 decimal places.
2. Express  in the form .Use your answer to show whether the graph of  crosses the *x*-axis.
3. The diagram shows the net of an open cuboid, with dimensions 7 cm, *x* cm and

cm. The volume of the cuboid is 840 cm³.

Find the dimensions of the cuboid.

*x* 

 7

1. The revenue for a company producing mobile phone cases is given by , where *x* is the price in pounds of each phone case. The cost

of production is given by . Determine the price that will allow the

company to break-even (make neither a profit nor a loss).

**Extension**

In the diagram below each of the rows and columns add up to the numbers shown.

Find the values of the letters *A* to *E* and hence find the value of *x*.

|  |  |  |  |
| --- | --- | --- | --- |
| *A* | *B* | *C* | *A* |
| *D* | *D* | *B* | *B* |
| *C* | *B* | *A* | *C* |
| *E* | *B* | *E* | *E* |

 16

 22

 22

 22

 19 *x*

## Answers

1. , 
2. , 
3. , 
4. 
5. , 
6. Tom has given the roots of the quadratic equation. The simultaneous solutions are where the two graphs intersect: ,  and , .

| *x* | f(*x*) |  | *x* | f(*x*) |  | *x* | f(*x*) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | -3 |  | 1.8 | -0.248 |  | 1.84 | -0.022 |
| 1.2 | -2.552 |  | 1.81 | -0.192 |  | 1.842 | -0.010 |
| 1.4 | -1.976 |  | 1.82 | -0.136 |  | 1.844 | 0.0015 |
| 1.6 | -1.224 |  | 1.83 | -0.079 |  |  |  |
| 1.8 | -0.248 |  | 1.84 | -0.022 |  |  |  |
| 2 | 1 |  | 1.85 | 0.037 |  |  |  |

Therefore  to 2 decimal places.

1. . Solving  gives  so .

It is not possible to find the square root of a negative number, so the graph does not cross the *x*-axis.

1. Solving  gives  and .

A dimension must be positive so  and the dimensions of the cuboid are 7 cm, 12 cm and 10 cm.

1. £16.82

**Extension**

, , ,  and , therefore .

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Use a graph to find the approximate roots of a quadratic equation |  |  |  |  | AO1 | 1 | Use a graph to find the approximate roots of a quadratic equation |  |  |  |
| AO1 | 2 | Solve two linear simultaneous equations in two variables |  |  |  |  | AO1 | 2 | Solve two linear simultaneous equations in two variables |  |  |  |
| AO1 | 3 | Rearrange and solve a quadratic equation |  |  |  |  | AO1 | 3 | Rearrange and solve a quadratic equation |  |  |  |
| AO1 | 4 | Solve a linear equation involving an algebraic fraction |  |  |  |  | AO1 | 4 | Solve a linear equation involving an algebraic fraction |  |  |  |
| AO1 | 5 | Rearrange and solve a quadratic equation |  |  |  |  | AO1 | 5 | Rearrange and solve a quadratic equation |  |  |  |
| AO2 | 6 | Use a graph to find the approximate solutions to the simultaneous equations for a line and a curve |  |  |  |  | AO2 | 6 | Use a graph to find the approximate solutions to the simultaneous equations for a line and a curve |  |  |  |
| AO2 | 7 | Find an approximate solution using a sign-change method |  |  |  |  | AO2 | 7 | Find an approximate solution using a sign-change method |  |  |  |
| AO2 | 8 | Use the completed square form of a quadratic equation |  |  |  |  | AO2 | 8 | Use the completed square form of a quadratic equation |  |  |  |
| AO3 | 9 | Solve a problem involving a quadratic equation |  |  |  |  | AO3 | 9 | Solve a problem involving a quadratic equation |  |  |  |
| AO3 | 10 | Solve a problem involving simultaneous equations (one linear and one quadratic) |  |  |  |  | AO3 | 10 | Solve a problem involving simultaneous equations (one linear and one quadratic) |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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