

Lesson 8

GCSE and Preparatory A-Level Mathematics Conic Sections (Simultaneous Equations IV)

8.1 Test

*Any solution based entirely on graphical
or numerical methods is not acceptable*

Marks Available : 40

Question 1

The Q Formula

A quadratic equation that is written in the form

$$ax^2 + bx + c = 0 \quad \text{where } a, b \text{ and } c \text{ are constants}$$

has real solutions, if any exist, given by the formula,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Show how to use the Q formula to solve the quadratic equation,

$$2x^2 + 10x + 5 = 0$$

and hence that $x = -\frac{5}{2} \pm \frac{\sqrt{15}}{2}$ are the two solutions.

[4 marks]

Question 2

GCSE Examination Question from May 2019, Paper 1HR, Q22

Solve the simultaneous equations

$$2x^2 + 3y^2 = 5$$

$$y = 2x + 1$$

Show clear algebraic working

[5 marks]

Question 3

GCSE Examination from June 2019, Paper 2HR, Q5

Factorise $x^2 - 5x - 36$

[2 marks]

Question 4

GCSE Examination Question from June 2019, Paper 2H, Q9

Solve the simultaneous equations,

$$x + 2y = -0.5$$

$$3x - y = 16$$

Show clear algebraic working.

[3 marks]

Question 5

GCSE Examination Question from May 2019, Paper 1H, Q12(a)

Factorise $2x^2 - 7x + 6$

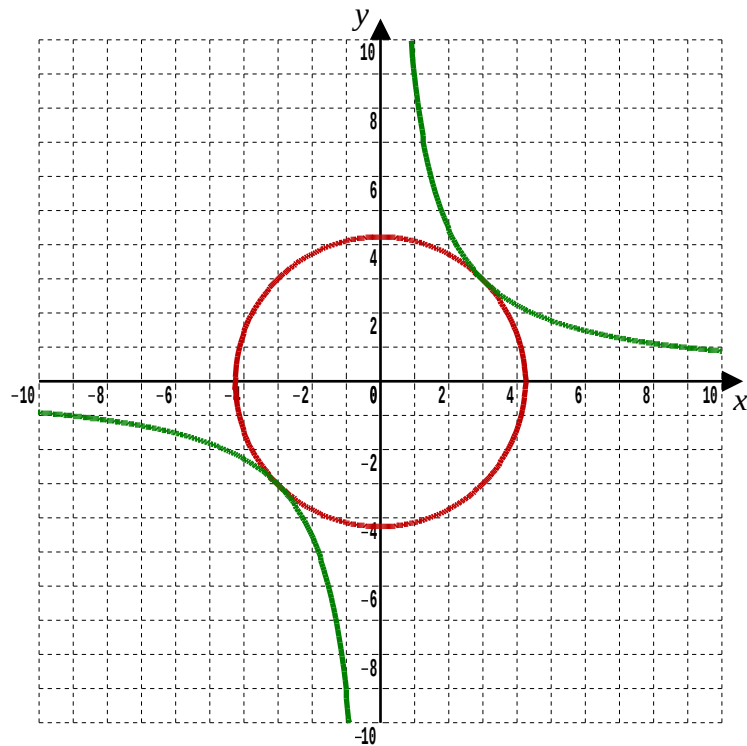
[2 marks]

Question 6

Vanessa has plotted a graph of a circle and a hyperbola,

Red Circle : $x^2 + y^2 = 24$

Green Hyperbola : $y = \frac{12}{x}$



Vanessa is not sure if the circle and hyperbola intersect or, they do, if they intersect in one, two, three or four points. Use algebra to find all points (if any) of intersection.

[8 marks]

Question 7

National 5 Examination Question from May 2022, Paper 2, Q7, SQA

Solve the equation $4x^2 + 2x - 7 = 0$

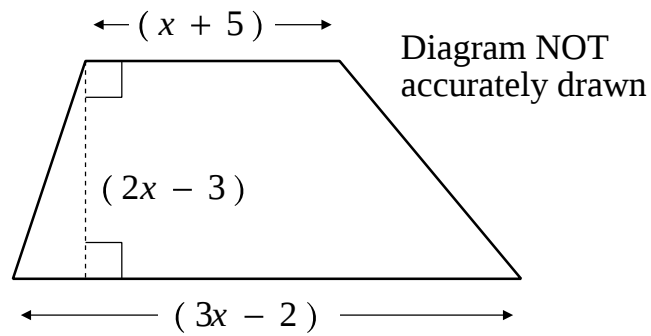
Give your answer correct to 2 significant figures.

[4 marks]

Question 8

GCSE Examination Question from January 2019, Paper 2H, Q15

The diagram shows a trapezium.



All measurements shown on the diagram are in centimetres.

The area of the trapezium is 133 cm^2

(a) Show that $8x^2 - 6x - 275 = 0$

[3 marks]

(b) Find the value of x
Show your working clearly

[3 marks]

Question 9

GCSE Examination Question from January 2019, Paper 2HR, Q21

The curve with equation $y = (10x - 3)(x + 1)$ and the line with equation $y - 6x = 0$ intersect at the points A and B

Find the coordinates of the midpoint of AB

Show your working clearly.

[6 marks]

This document is a part of a **Mathematics Community Outreach Project** initiated by Shrewsbury School

It may be freely duplicated and distributed, unaltered, for non-profit educational use

In October 2020, Shrewsbury School was voted “**Independent School of the Year 2020**”

© 2025 Number Wonder

Teachers may obtain detailed worked solutions to the exercises by email from MHHShrewsbury@Gmail.com