



Additional Math with Ali Hashir

Simultaneous Equations

Worksheet

CIE O Level Additional Mathematics 4037 • Total: 58 marks

Answer all questions. Where one equation is linear, use it to eliminate one variable by substitution before solving the resulting equation. For word problems, state clearly what each variable represents before forming your equations. Give all answers as exact values.

Q1

Find the coordinates of the points where the line $y = x - 1$ meets the curve

$$x^2 + y^2 = 13.$$

[4]

Q2

Find the coordinates of the points where the line $y = 2x - 6$ meets the curve

$$y = x^2 - x - 6.$$

[4]

Q3

The hypotenuse of a right-angled triangle is 17 cm long. One of the other two sides is 7 cm longer than the third side. Taking x cm and y cm as the lengths of the two shorter sides, write down a pair of simultaneous equations in x and y , and solve them to find the lengths of the two shorter sides. [5]

Q4

A rectangle has an area of 48 cm^2 . Its length is 2 cm greater than its width. Taking x cm and y cm as the length and width of the rectangle, form a pair of simultaneous equations and solve them to find its dimensions. [5]

Q5

Find the coordinates of the points where the line $y = x + 1$ meets the curve

$$y = \frac{6}{x}.$$

[5]

Q6

Solve the simultaneous equations

$$x + 2y = 8, \quad x^2 + 4y^2 = 32.$$

Show that there is only one pair of values of x and y satisfying both equations. [5]

Q7

Solve the simultaneous equations

$$x - y = 2, \quad y^2 = 3x - 2.$$

[4]

Q8

The sum of two numbers is 9 and the sum of their squares is 53. Find the two numbers. [5]

Q9

A rectangle has a perimeter of 32 cm. If its length is increased by 2 cm and its width decreased by 1 cm, the area of the rectangle is unchanged. Taking x cm and y cm as the original length and width, form a pair of simultaneous equations and solve them to find the original dimensions. [6]

Q10

The line $y = x + 1$ intersects the curve $xy = 12$ at two points. Find the coordinates of these two points, and calculate the distance between them, giving your answer in the form $k\sqrt{2}$. [7]

Challenge

A train travels a distance of 120 km at a constant average speed of v km/h, taking t hours to complete the journey. It is also known that $v + 10t = 70$.

- (i) Write down two equations in v and t that represent this information. [2]
- (ii) By eliminating v , show that t satisfies the equation $t^2 - 7t + 12 = 0$. [3]
- (iii) Solve this equation, and hence find the two possible pairs of values of v and t . [3]

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0 1
Additional Math with Ali Hashir
@vectorspacepk • www.vectorspace.pk

Answers available at the website.

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Instagram: @vectorspacepk

Website: www.vectorspace.pk