

Simultaneous Equations: 3 Unknowns

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Examples

Workout



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Question 1: Solve the following simultaneous equations

(a) $6x + y + 3z = 55$
 $3x + y + z = 26$
 $2x + y - 2z = 7$

(b) $2x + 3y + z = 23$
 $x + y - z = 6$
 $x + y + z = 10$

(c) $2x + 5y + z = 12$
 $x + 4y - z = 9$
 $x + y + z = 2$

(d) $3x + 7y + 2z = 26$
 $3x - 5y - 3z = 23$
 $3x - 4y + z = 34$

(e) $4x + 4y + 3z = 9$
 $3x - 4y - z = -17$
 $x - 4y + 5z = 5$

(f) $2x + y + 2z = 46$
 $2x - 3y + z = 11$
 $2x + 4y + 3z = 75$

Question 2: Solve the following simultaneous equations

(a) $x - y + 3z = 5$
 $x + y + 6z = 12$
 $3x - 2y + 2z = 10$

(b) $3x + y + 2z = 5$
 $4x + 2y + 3z = 10$
 $2x - y + 5z = 4$

(c) $2x + y + 4z = 11$
 $6x + 3y + 8z = 29$
 $2x - 3y + 2z = 21$

(d) $3x - 3y - 2z = 23$
 $8x - y + 4z = 73$
 $7x - 4y - 2z = 60$

(e) $2x + 4y - z = 15$
 $3x + 8y + z = 44$
 $x + 2y + 2z = 15$

(f) $2x + 3y + 5z = 21$
 $3x + 6y + 15z = 51$
 $5x + 4y + 10z = 37$

(g) $2x + 4y + 7z = 6$
 $6x - 2y + z = 3$
 $3x + 9y - 5z = 32$

(h) $10x + 60y + 10z = 4$
 $20x + 20y + 40z = 14$
 $5x + 40y + 20z = -2$

(i) $3x - 2y + 6z = 5$
 $4x + 5y + 8z = -1$
 $2x + 9y - 10z = 0$

Question 3: Solve the following simultaneous equations

(a) $2x + 3y + 2z = 50$
 $2y - x + 3z = 33$
 $4z + 5y - 3x = 40$

(b) $y + z = 6x - 32$
 $2y + 48 = 8x + z$
 $50 + 10z = y + 12x$

(c) $y - x + 2z = 2.1$
 $3x - 2z - y + 2.5 = 0$
 $8z + 10y + 5x = 4.5$

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Question 1: In a shop, a ruler cost x pence, a pencil cost y pence and a pen cost z pence.

Jack bought 4 rulers, 2 pencils and a pen for £3.10

Manisha bought a ruler, 4 pencils and 4 pens for £2.40

Darragh bought 2 rulers, 2 pencils and 5 pens for £2.70

(a) Set up 3 equations in terms of x , y and z .

(b) Solve these equations to find the cost of each item.

Question 2: Isla is trying to answer a question that her teacher has set her.

$$3x + y + 2z = 31$$

$$4x - y + z = 37$$

$$9x + 3y + 6z = 93$$

Isla believes that there may be a problem with the question.

Do you agree? Explain your answer.

Question 3: Esme, Freddy and Georgie each complete quizzes for three subjects, physics, chemistry and biology.

Let x , y and z represent the total number of questions in the physics, chemistry and biology quizzes respectively.

Esme got 80% of the questions correct in the physics quiz, 60% in the chemistry quiz and 20% in the biology quiz. Altogether, Esme answered 96 questions correctly.

(a) Show that x , y and z satisfy the equation $4x + 3y + z = 480$

Freddy got 50% of the questions correct in the physics quiz, 75% in the chemistry quiz and 25% in the biology quiz. Altogether, Freddy answered 100 questions correctly.

(b) Show that x , y and z satisfy the equation $2x + 3y + z = 400$

Georgie got 90% of the questions correct in the physics quiz, 80% in the chemistry quiz and 50% in the biology quiz. Altogether, Georgie answered 126 questions correctly.

(c) Show that x , y and z satisfy the equation $9x + 8y + 5z = 1260$

(d) Work out how many questions were asked in total in the 3 quizzes.

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Question 4: A train company sells three different types of ticket for a journey.

They sell x economy tickets at a cost of £10 each.

They sell y business class tickets at a cost of £30 each.

They sell z first class tickets at a cost of £60 each.

The total income from ticket sales was £2920

(a) Show that x, y and z satisfy the equation $x + 3y + 6z = 292$

The number of economy tickets sold were 48 more than the total number of business class and first class tickets sold.

(b) Write down a second equation connecting x, y and z .

On the next journey, there were

twice as many economy tickets sold

three times as many business class tickets sold

8 more first class tickets sold

The total income from this journey was £6320

(c) Show that $2x + 9y + 6z = 632$

(d) Find the values of x, y and z .

Question 5: A football club sell tickets for their matches.

An adult ticket costs £ x , a child ticket cost £ y and a senior ticket for £ z .

For a friendly match, they sold 450 adult tickets, 375 child tickets and 75 senior tickets. The total income from ticket sales was £4725.

(a) Show that x, y and z satisfy the equation $6x + 5y + z = 63$

For a league match, they sold 600 adult tickets, 300 child tickets and 225 senior tickets. The total income from ticket sales was £6525.

(b) Show that x, y and z satisfy the equation $8x + 4y + 3z = 87$

For a cup match, the price of the child tickets is halved.

675 adults tickets, 750 child tickets and 150 senior tickets were sold.

The total income was £6900

(c) Show that x, y and z satisfy the equation $9x + 5y + 2z = 92$

(d) Solve the simultaneous equations to find x, y and z .

Answers



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