Systems of Equations: exam practice

10 questions · 27 marks · worked solutions and markschemes

Name _____ Date _____ Score / 27

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/hlai/systems-of-equations-exam-practice

1. **2 marks · Paper 1 style · calculator allowed**

Solve the system $3x + 2y = 12$, $5x - 4y = -2$.

Find x and y. **[2]**

2. **2 marks · Paper 2 style · calculator allowed**

Solve $x + 2y + z = 8$, $2x - y + 3z = 9$, $3x + y - 2z = -1$.

Find x, y and z. **[2]**

3. **2 marks · Paper 2 style · calculator allowed**

Use technology to solve $x^4 - 3x^2 - 4 = 0$ for real x.

Find the real solutions. **[2]**

4. **2 marks · Paper 1 style · calculator allowed**

The lines $2x + ky = 5$ and $4x + 6y = 7$ have no point of intersection.

Find k. **[2]**

5. **3 marks · Paper 2 style · calculator allowed**

Use technology to solve $2x^3 - 5x^2 - 4x + 3 = 0$.

Find all solutions. **[3]**

6. **3 marks · Paper 2 style · calculator allowed**

Tickets to a show cost $\$12$ for adults and $\$7$ for children. 340 tickets were sold for $\$3355$.

Find the number of adult and child tickets sold. **[3]**

7. **3 marks · Paper 2 style · calculator allowed**

A quadratic $y = ax^2 + bx + c$ passes through $(1, 2)$, $(3, 12)$ and $(-2,\ 9.5)$.

Find a, b and c. **[3]**

8. **3 marks · Paper 2 style · calculator allowed**

A box with a square base of side x cm and height $(x+2)$ cm has volume $150\ \text{cm}^3$.

Write an equation and use technology to find x. **[3]**

9. **3 marks · Paper 2 style · calculator allowed**

Three numbers have sum 20. The first is twice the second, and the third is 4 more than the second.

Find the three numbers. **[3]**

10. **4 marks · Paper 2 style · calculator allowed**

A bakery uses flour, sugar and butter (in kg) for three cakes. Cake A uses $0.4, 0.2, 0.1$; cake B uses $0.3, 0.3, 0.2$; cake C uses $0.5, 0.1, 0.2$. There are 22 kg of flour, 10.4 kg of sugar and 7.8 kg of butter, all used up.

Find the number of each cake made. **[4]**

Answers and worked solutions

Question 1 — 2 marks

Answer: $x = 2, y = 3$

GDC or elimination **(M1)**

$x = 2, y = 3$ **A1**

Question 2 — 2 marks

Answer: $x = 1, y = 2, z = 3$

GDC **(M1)**

$x = 1, y = 2, z = 3$ **A1**

Question 3 — 2 marks

Answer: $x = \pm 2$

GDC **(M1)**

$x = \pm 2$ **A1**

Question 4 — 2 marks

Answer: 3

parallel: $\frac{2}{4} = \frac{k}{6}$ **M1**

$k = 3$ **A1**

Question 5 — 3 marks

Answer: $x = -1$, $x = 0.5$, $x = 3$

$x = -1$ **A1**

$x = 0.5$ **A1**

$x = 3$ **A1**

Question 6 — 3 marks

Answer: 195 adult, 145 child

$a + c = 340$,
$12a + 7c = 3355$ **M1**

$a = 195$ **A1**

$c = 145$ **A1**

Question 7 — 3 marks

Answer: $a = 1.5$, $b = -1$, $c = 1.5$

$a + b + c = 2$,
$9a + 3b + c = 12$,
$4a - 2b + c = 9.5$ $M1$**A1**

$a = 1.5, b = -1, c = 1.5$ **A1**

Question 8 — 3 marks

Answer: $x = 4.72$

$x^2(x + 2) = 150$ **M1**

$x^3 + 2x^2 - 150 = 0$ **A1**

$x = 4.72$ **A1**

Question 9 — 3 marks

Answer: $8, 4, 8$

$a + b + c = 20$, $a = 2b$, $c = b + 4$ **M1**

$4b + 4 = 20$ **A1**

$8,\ 4,\ 8$ **A1**

Question 10 — 4 marks

Answer: 30 of A, 10 of B, 14 of C

$0.4a + 0.3b + 0.5c = 22$ **M1**

$0.2a + 0.3b + 0.1c = 10.4$,
$0.1a + 0.2b + 0.2c = 7.8$ **A1**

GDC **(M1)**

$a = 30, b = 10, c = 14$ **A1**

Every solution is also on ibmathrevision.com/hlai/systems-of-equations-exam-practice
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