MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
36	55 minutes	3

Name: _____ Class: _____

Date: _____

MARK ____ / 36

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 Solve simultaneously: $x + y = 10$ and $x - y = 4$. (1)

A) $x = 7$ and $y = 3$ ✓ **B)** $x = 14$ and $y = 6$

C) $x = 3$ and $y = 7$ **D)** $x = 6$ and $y = 4$

Answer: A — Adding the two equations gives $2x = 14$, so $x = 7$ and then $y = 3$.

- **B** — added the equations but never divided the 14 by 2
- **C** — answered x and y the wrong way round
- **D** — used $10 - 4 = 6$ for x without halving the sum

1.2 Solve simultaneously: $y = 2x + 1$ and $3x + y = 11$. (1)

A) $x = 3$ and $y = 7$ **B)** $x = 2$ and $y = 5$ ✓

C) $x = 5$ and $y = 2$ **D)** $x = 2$ and $y = 4$

Answer: B — Substituting gives $3x + (2x + 1) = 11$, so $5x = 10$, $x = 2$ and $y = 5$.

- **A** — satisfies only $y = 2x + 1$ — check it in BOTH equations
- **C** — answered x and y the wrong way round
- **D** — substituted $x = 2$ into $2x$ and forgot the $+ 1$

1.3 Solve simultaneously: $2x + 3y = 12$ and $2x - y = 4$. (1)

A) $x = 2$ and $y = 3$ **B)** $x = 6$ and $y = 0$

C) $x = 3$ and $y = 2$ ✓ **D)** $x = 3$ and $y = 4$

Answer: C — Subtracting the second from the first gives $4y = 8$, so $y = 2$ and then $2x = 6$.

- **A** — answered x and y the wrong way round
- **B** — satisfies only the FIRST equation
- **D** — added the equations instead of subtracting, so the $2x$ never cancelled

1.4 On a set of axes, the solution of a pair of simultaneous linear equations is ... (1)

A) the point where the two lines cut ✓
B) the gradient of both lines
C) the y-intercept of both lines
D) the point where each line cuts the x-axis

> **Answer: A** — The solution is the ONE pair $(x\,;y)$ satisfying both equations, which is where the graphs meet.
> - **B** — the gradient is a rate of change, not a solution
> - **C** — the y-intercept is where a line meets the y-axis, not where the lines meet each other
> - **D** — each x-intercept lies on ONE line only

1.5 If the two lines are PARALLEL, the simultaneous equations have ... (1)

A) one solution
B) two solutions
C) infinitely many solutions
D) no solution ✓

> **Answer: D** — Parallel lines never meet, so no pair $(x\,;y)$ can satisfy both equations.
> - **A** — one solution needs the lines to CUT, which parallel lines never do
> - **B** — two straight lines can never cut each other twice
> - **C** — that happens when the two equations describe the SAME line, not parallel ones

1.6 Three pens and two books cost R74. One pen and one book cost R32. A book costs ... (1)

A) R42
B) R10
C) R32
D) R22 ✓

> **Answer: D** — $p + b = 32$ gives $p = 32 - b$; substituting into $3p + 2b = 74$ leaves $b = 22$.
> - **A** — subtracted the two equations without first matching the coefficients
> - **B** — that is the price of a PEN, not of a book
> - **C** — that is the cost of a pen AND a book together

1.7 Solve simultaneously: $5x + 2y = 16$ and $3x - 2y = 8$. (1)

A) $x = 24$ and $y = 0{,}5$
B) $x = 3$ and $y = 1$
C) $x = 3$ and $y = 0{,}5$ ✓
D) $x = 3$ and $y = -0{,}5$

> **Answer: C** — Adding eliminates y: $8x = 24$, so $x = 3$, and $15 + 2y = 16$ gives $y = 0{,}5$.
> - **A** — added the equations but never divided the 24 by 8
> - **B** — solved $2y = 1$ as $y = 1$ instead of halving
> - **D** — dropped the minus on the $2y$ when substituting back

1.8 The sum of two numbers is 25 and their difference is 7. The SMALLER number is ... (1)

A) 9 ✓
B) 18
C) 12,5
D) 16

> **Answer: A** — Adding gives $2x = 32$, so the larger number is 16 and the smaller is $25 - 16 = 9$.
> - **B** — used $25 - 7 = 18$ without halving
> - **C** — halved 25 and ignored the difference altogether
> - **D** — that is the LARGER number

1.9 To eliminate y from $3x + 2y = 7$ and $5x + 3y = 11$, multiply ... (1)

A) both equations by 6 **B)** the first by 5 and the second by 3

C) the first by 3 and the second by 2 ✓ **D)** the first by 2 and the second by 3

> **Answer: C** — $2y \times 3$ and $3y \times 2$ both become $6y$, so subtracting removes y.
> - **A** — multiplying BOTH by 6 changes nothing — the coefficients still differ
> - **B** — those multipliers match the x coefficients, so they eliminate x, not y
> - **D** — that gives $4y$ and $9y$, which do not cancel

1.10 Is $(x\,;y) = (4\,;-1)$ a solution of $2x + 3y = 5$ and $x - y = 5$? (1)

A) no — it satisfies neither **B) yes — it satisfies both equations ✓**

C) it satisfies only the second **D)** it satisfies only the first

> **Answer: B** — $2(4) + 3(-1) = 8 - 3 = 5$, and $4 - (-1) = 5$.
> - **A** — both checks do work — substitute and see
> - **C** — $8 - 3 = 5$ as well, so the first holds too
> - **D** — $4 - (-1) = 5$ as well, so the second holds too

ANSWER GRID — MARKING GUIDELINE

1.1	(A)	B	C	D
1.2	A	(B)	C	D
1.3	A	B	(C)	D
1.4	(A)	B	C	D
1.5	A	B	C	(D)
1.6	A	B	C	(D)
1.7	A	B	(C)	D
1.8	(A)	B	C	D
1.9	A	B	(C)	D
1.10	A	(B)	C	D

QUESTION 2 [12 MARKS]

Solve the following simultaneously. Show ALL your working.

2.1 $2x + 4k = 20$ and $3x - 2k = 6$ (5)

> Multiply the second equation by 2: $6x - 4k = 12$ *(1)*
> Add: $8x = 32$ *(2)*
> $\boldsymbol{x = 4}$ *(1)*
> $\boldsymbol{k = 3}$ *(1)*

2.2 $y = 2x$ and $x + y = 9$ (3)

> $x + 2x = 9$ *(1)*
> $3x = 9$ *(1)*
> $\boldsymbol{x = 3}$ **and** $\boldsymbol{y = 6}$ *(1)*

2.3 A farmer counts 30 heads and 80 legs among his chickens and cows. Determine, WITH THE USE OF TWO EQUATIONS, how many of each he has. **(4)**

> Let c = the number of chickens and k = the number of cows *(1)*
> $c + k = 30$ and $2c + 4k = 80$ *(1)*
> Doubling the first: $2c + 2k = 60$; subtracting gives $2k = 20$ *(1)*
> **20 chickens and 10 cows** *(1)*

QUESTION 3 [14 MARKS]

Answer the word problems below, using simultaneous equations.

3.1 Three apples and two pears cost R16, while one apple and four pears cost R12. Determine the price of each fruit. **(5)**

> $3a + 2p = 16$ and $a + 4p = 12$ *(2)*
> From the second: $a = 12 - 4p$ *(1)*
> $3(12 - 4p) + 2p = 16$ gives $p = 2$ *(1)*
> **an apple R4, a pear R2** *(1)*

3.2 Explain what the solution of a pair of simultaneous linear equations represents graphically, and what it means if there is NO solution. **(4)**

> The solution is the point where the two lines INTERSECT *(2)*
> No solution means the lines are PARALLEL *(1)* and never meet *(1)*

3.3 A cinema charges R60 for an adult and R35 for a child. 120 tickets were sold for R5 725. Determine how many of each were sold. **(5)**

> $a + c = 120$ and $60a + 35c = 5\,725$ *(2)*
> $c = 120 - a$ *(1)*
> $60a + 35(120 - a) = 5\,725$, so $25a = 1\,525$ *(1)*
> **61 adults and 59 children** *(1)*

TOTAL: 36 marks

This question paper consists of 3 questions.

© Danemathics — free to print and share for classroom use.