

## Proofs (Foundation)

Please write clearly in block capitals

Forename:

Surname:

### Materials

For this paper you must have:

- mathematical instruments



You *can* use a calculator.

### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- You may ask for graph paper, tracing paper and more answer paper. These must be tagged securely to this answer book.

### Advice

- In all calculations, show clearly how you work out your answer.

1 Show that the following statements are true:

1(a)  $5(2x - 3) - 2 \equiv 10x - 17$

[2 marks]

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Answer \_\_\_\_\_

1(b)  $(n - 2)^2 + 3 \equiv n^2 - 4n + 7$

[2 marks]

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Answer \_\_\_\_\_

1(c)  $(x + 1)^2 - x^2 \equiv 2x + 1$

[2 marks]

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Answer \_\_\_\_\_

Turn over for next question

**2** Show that the following statements are true:

**2(a)**  $5(3x - 5) - 2(2x + 9) \equiv 11x - 43$

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

**2(b)**  $(n - 2)^2 - (n - 5)^2 \equiv 3(2n - 7)$

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

**2(c)**  $(n + 2)^2 - 3(n + 4) \equiv (n + 4)(n - 3) + 4$

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

**2(d)**  $3(n + 3)(n - 1) - 3(1 - n) \equiv (3n - 3)(n + 4)$

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

**Turn over for next question**

Turn over ►

**3** Show that the following statements are true,

**3(a)**  $(3n + 1)(n + 3) - n(3n + 7) \equiv 3(n + 1)$

**[3 marks]**

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Answer \_\_\_\_\_

**3(b)**  $(n + 3)^2 - (3n + 5) \equiv (n + 1)(n + 2) + 2$

**[3 marks]**

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Answer \_\_\_\_\_

**3(c)**  $(n - 3)^2 - (2n + 1) \equiv (n - 4)^2 - 8$

**[3 marks]**

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Answer \_\_\_\_\_

**3(d)**  $\frac{1}{8}(4n + 1)(n + 8) - \frac{1}{8}n(4n + 1) \equiv 4n + 1$

**[3 marks]**

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Answer \_\_\_\_\_

**Turn over for next question**

4 Prove the product of two even numbers is always even.

[2 marks]

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Answer \_\_\_\_\_

5 Prove that the product of two odd numbers is always odd.

[2 marks]

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Answer \_\_\_\_\_

6 Prove algebraically that the sum of two consecutive numbers is odd.

[3 marks]

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Answer \_\_\_\_\_



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Turn over ►

- 7(a)** Tom says that  $7x - (2x + 3)(x + 2)$  is always negative.  
Is he correct? Explain your answer.

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

- 7(b)** Change a single number in Tom's statement that would lead to a change in your conclusion.  
Why is this the case?

[1 mark]

\_\_\_\_\_

Answer \_\_\_\_\_



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