Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Factorising and completing the square

Time allowed: 35 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 29

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 29 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 Factorise completely.

(a) $10 + 16w$

..... [1]

(b) $12tx - 8t^2$

..... [2]

(a) Factorising out a common factor (b) Factorising out a common factor Click for more variations

1(a)	$2(5+8w)$	**1**	
1(b)	$4t(3x-2t)$	**2**	**B1** for answer $4(3tx-2t^2)$ or $t(12x-8t)$ $2(6tx-4t^2)$ or $2t(6x-4t)$

2 Factorise completely.

$$4x^2y - 5xy^2$$

..... [2]

Factorising out a common factor Click for more variations

2	$xy(4x-5y)$ final answer	**2**	**B1** for $y(4x^2-5xy)$ or $x(4xy-5y^2)$ or $xy(4x-5y)$ seen then spoilt

3 Factorise completely.

$$15k^2m - 20m^4$$

..... [2]

Factorising out a common factor Click for more variations

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3	$5m\left(3k^2-4m^3\right)$ final answer	**2**	**B1** for $5\left(3k^2m-4m^4\right)$ or $m\left(15k^2-20m^3\right)$ or for $5m\left(3k^2-4m^3\right)$ with one error in a number

4 Factorise completely.

$$xy + 2y + 3x + 6$$

..... [2]

Factorising by grouping Click for more variations

4	$(x + 2)(y + 3)$ final answer	**2**	**B1** for $y(x + 2) + 3(x + 2)$ or $x(y + 3) + 2(y + 3)$

5 Factorise $2x^2 - 5x - 3$.

Answer ..... [2]

Factorising harder quadratics Click for more variations

5	$(2x+1)(x-3)$	**2**	**B1** for $(2x+a)(x+b)$, where $ab = -3$ or $a + 2b = -5$

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6 $x^2 - 16x + a$ can be written in the form $(x+b)^2$.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [2]

Completing the square Click for more variations

6	[a =] 64 [b =] −8	**2**	**B1** for each or for both $(x - 8)^2$ and $x^2 - 16x + 64$

7 **(a)** Factorise $p^2 - q^2$.

..... [1]

(b) $p^2 - q^2 = 7$ and $p - q = 2$.

Find the value of $p + q$.

..... [2]

(a) Difference of two squares (b) Difference of two squares Click for more variations

7(a)	$(p-q)(p+q)$ final answer	**1**	
7(b)	$\frac{7}{2}$ oe	**2**	**M1** for $2 \times (p + q) = 7$ or for $(2+q)^2 - q^2 = 7$ or $p^2 - (p-2)^2 = 7$

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8 $2x^2 + 12x - 2$ can be written in the form $a(x+b)^2 - c$.

Find the values of a, b and c.

$a =$ ..... , $b =$ ..... , $c =$ ..... [3]

Completing the square Click for more variations

8	$a = 2$ $b = 3$ $c = 20$	**3**	**B2** for any two correct For c, FT 2 + *their* $a \times$ *their* $(b)^2$ or **B1** for $b = 3$ nfww OR **B2** for $2(x+3)^2 - 20$ or **M1** for $(x + 3)^2$ seen or for $ax^2 + 2abx + ab^2 - c$ or for $a = 2$ and one of $2ab = 12$ and $ab^2 - c = -2$

9 Simplify.

$$\frac{pt - p - t + 1}{1 - t^2}$$

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..... [4]

Simplifying algebraic fractions Click for more variations

9	$\frac{1-p}{1+t}$ oe final answer	**4**	**B2** for $(p-1)(t-1)$ oe or **B1** for $p(t-1)-(t-1)$ or $t(p-1)-(p-1)$ **B1** for $(1-t)(1+t)$ oe

10 **(a)** Write down **all** the factors of 18.

..... [2]

(b) Factorise.

$3y-xy+15-5x$

..... [2]

(c) $3y-xy+15-5x=18$

where x and y are positive integers.

Using your answers to **part (a)** and **part (b)**, find one possible value of x and the corresponding value of y.

$x =$ ..... , $y =$ ..... [2]

(a) Types of number (b) Factorising by grouping (c) Factorising harder quadratics Click for more variations

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10(a)	1, 2, 3, 6, 9, 18	**2**	**B1** for a list with one error or one omission
10(b)	$(y + 5)(3 - x)$ final answer	**2**	**M1** for $y(3 - x) + 5(3 - x)$ or for $3(y + 5) - x(y + 5)$ or for correct answer seen and spoilt
10(c)	$x = 2$, $y = 13$ or $x = 1$, $y = 4$	**2**	FT *their* **(b)** for **M1** **M1** for *their* $3 - x = a$ and *their* $y + 5 = b$ where $ab = 18$ and a, b integers

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