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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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HCF and LCM with prime factors

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2, Paper 3 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

/ 32

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 32 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 Write 180 as a product of its prime factors.

..... [2]

Prime factor decomposition Click for more variations

1	$2 \times 2 \times 3 \times 3 \times 5$ oe	**2**	**B1** for 2, 2, 3, 3, 5 or **M1** for correct factor tree/diagram/table.

2 Find the highest common factor (HCF) of 36 and 54.

..... [2]

HCF and LCM Click for more variations

2	18	**2**	**B1** for answer 2 or 3 or 6 or 9 or **M1** for $2 \times 3 \times 3$ oe as final answer or $36 = 2 \times 2 \times 3 \times 3$ and $54 = 2 \times 3 \times 3 \times 3$ or 2 correct factor trees or tables

3 Find the lowest common multiple (LCM) of 20 and 36.

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..... [2]

HCF and LCM Click for more variations

3	180	**2**	**B1** for $180k$ as final answer or **M1** for [20 =] 2 × 2 × 5 and [36 =] 2 × 2 × 3 × 3 or 2 correct factor trees or tables or lists or a list of multiples of both 20 and 36 with at least 3 of each or 2 × 2 × 3 × 3 × 5 oe

4 $A = 2^3 \times 3$ $B = 3^2 \times 5$

(a) Find the highest common factor (HCF) of A and B.

..... [1]

(b) Find the lowest common multiple (LCM) of A and B.

..... [2]

(a) HCF and LCM (b) HCF and LCM Click for more variations

4(a)	3	**1**	
4(b)	360	**2**	**B1** for answer $360k$, $k > 1$ or **M1** for $2^3 \times 3^2 \times 5$ oe or for 24, 48, 72… **and** 45, 90, 135… seen

5 Find the lowest common multiple (LCM) of $15xy^3$ and $18x^4y$.

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..... [2]

HCF and LCM Click for more variations

5	$90x^4y^3$ final answer	**2**	**B1** for two correct parts from: 90, x^4 and y^3 or for $3\times5\times x\times y\times y\times y$ and $2\times3\times3\times x\times x\times x\times x\times y$ or for correct answer seen then spoilt

6 The highest common factor (HCF) of two numbers is 6.
The lowest common multiple (LCM) of the two numbers is 90.
Both numbers are greater than 6.

Work out the two numbers.

..... and ..... [2]

HCF and LCM Click for more variations

6	18 30	**2**	**B1** for 2 numbers with HCF 6 or LCM 90 or for 2 numbers greater than 6 with product 540 OR **M1** for some multiples of 6 including 18 and 30 or for some factors of 90 including 18 and 30 or for a tree diagram/table showing prime factors of 540 or 6 **and** 90

7 **(a)** Write 30 as a product of its prime factors.

Answer(a) ..... [2]

(b) Find the lowest common multiple (LCM) of 30 and 45.

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Answer(b) ..... [2]

(a) Prime factor decomposition (b) HCF and LCM Click for more variations

7 (a)	$2 \times 3 \times 5$	**2**	**B1** for 2, 3, 5 as prime factors
(b)	90	**2**	**B1** for $90k$ or for listing multiples of each up to 90 or $2 \times 3^2 \times 5$

8 Bell *A* rings every 22 minutes.
Bell *B* rings every 14 minutes.
Both bells ring at 09 00.

Work out the next time both bells ring together.

..... [3]

HCF and LCM Click for more variations

8	11 34	**3**	**B2** for 154 or 2h 34 mins or **M1** for $154k$ or $2 \times 7 \times 11$ or for [22 =]11×2 and [14 =] 7×2 or two correct factor trees/tables of both 22 and 14 OR **M2** for listing times or multiples for both bells to at least 11 34 or 154 or **M1** for listing 3 of each or one full list

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9 **(a)** $120 = 2^m \times 3 \times 5$

Find the value of m.

$m =$ ..... [1]

(b) One traffic light changes to red every 120 seconds.
Another traffic light changes to red every 144 seconds.
Both change to red at 10 00.

Find the time at which they next change to red together.

..... [3]

(a) Prime factor decomposition (b) HCF and LCM Click for more variations

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9(a)	3 cao	**1**	

9(b)	10 12	**3**	**B2** for 720 or 12 mins **OR** **M1** for 720k or $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5$ or [144 =] $2 \times 2 \times 2 \times 2 \times 3 \times 3$ and [120 =] $2 \times 2 \times 2 \times 3 \times 5$ or correct factor trees or tables of both 120 and 144 **OR** **M2** for listing times/multiples of both 120 and 144 to at least 720 or 10 12 or **M1** for listing at least 3 of each or one full list

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10 **(a)** **(i)** Write 180 as a product of its prime factors.

..... [2]

(ii) Find the lowest common multiple (LCM) of 180 and 54.

..... [2]

(b) An integer, X, written as a product of its prime factors is $a^2 \times 7^{b+2}$.
An integer, Y, written as a product of its prime factors is $a^3 \times 7^2$.

The highest common factor (HCF) of X and Y is 1225.
The lowest common multiple (LCM) of X and Y is 42 875.

Find the value of X and the value of Y.

$X =$ .....

$Y =$ ..... [4]

(a)(i) Prime factor decomposition (a)(ii) HCF and LCM (b) HCF and LCM Click for more variations

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10(a)(i)	$2^2 \times 3^2 \times 5$ oe	**2**	**M1** for 3 correct prime factors in a tree or table seen before the first error or for 2, 3, 5 identified
10(a)(ii)	540	**2**	**M1** for $2^2 \times 3^3 \times 5$ or 2×3^3 shown or answer $540k$

10(b)	$X = 8575$ $Y = 6125$	**4**	**B3** for $X = 8575$ or $Y = 6125$ or **B2** for $a = 5$ or $b = 1$ soi or **B1** for $1225 = 5^2 \times 7^2$ or $42\,875 = 5^3 \times 7^3$ or **M1** for $a^2 \times 7^2$ [= 1225] or $a^3 \times 7^{b+2}$ [= 42 875]

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