DANEMATHICS
FREE CAPS MATHS RESOURCES

GRADE 8 · WHOLE NUMBERS

HCF and LCM (Highest Common Factor & Lowest Common Multiple)

MARKING GUIDELINE

MARKS	DURATION	QUESTIONS
33	50 minutes	3

Name: ..... Class: .....

Date: .....

MARK ____ / 33

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 The HCF of 24 and 36 is ... (1)

A) 4 **B)** 72

C) 12 ✓ **D)** 6

Answer: C — $24 = 2^3 \times 3$ and $36 = 2^2 \times 3^2$, so the HCF is $2^2 \times 3 = 12$.

- **A** — left out the 3
- **B** — that is the LCM
- **D** — took only one 2

1.2 The LCM of 4 and 10 is ... (1)

A) 14 **B)** 2

C) 20 ✓ **D)** 40

Answer: C — 20 is the smallest number that both 4 and 10 divide into.

- **A** — added the two numbers
- **B** — that is the HCF
- **D** — 4×10 is a common multiple, but not the LOWEST

1.3 Two ropes are 18 m and 24 m long. They must be cut into equal pieces, as LONG as possible, with nothing left over. Each piece is ... (1)

A) 72 m
B) 42 m
C) 3 m
D) 6 m ✓

> **Answer: D** — The longest equal piece is the HCF of 18 and 24, which is 6 m.
> - **A** — that is the LCM — longer than either rope
> - **B** — added the two lengths
> - **C** — a common factor, but not the highest

1.4 Two taxis leave a rank together. One returns every 15 minutes and the other every 20 minutes. They next leave together after ... (1)

A) 300 minutes
B) 60 minutes ✓
C) 35 minutes
D) 5 minutes

> **Answer: B** — This is the LCM of 15 and 20, which is 60 minutes.
> - **A** — used 15×20
> - **C** — added the two times
> - **D** — that is the HCF

1.5 For any two whole numbers, HCF × LCM equals ... (1)

A) their product ✓
B) the larger number
C) their sum
D) their difference

> **Answer: A** — For 12 and 18: HCF $6 \times$ LCM $36 = 216$, and $12 \times 18 = 216$.
> - **B** — 216 is far bigger than either number
> - **C** — $6 + 36 = 42$, but $12 + 18 = 30$
> - **D** — $36 - 6 = 30$, but $18 - 12 = 6$

1.6 Which one of the following is TRUE of the HCF of two numbers? (1)

A) It is never smaller than either number
B) It divides into both numbers ✓
C) Both numbers divide into it
D) It is always a prime number

> **Answer: B** — A common FACTOR goes into both numbers.
> - **A** — the HCF is at most the smaller of the two
> - **C** — that describes a common MULTIPLE
> - **D** — the HCF of 12 and 18 is 6, which is not prime

1.7 The HCF of two numbers is 1. The numbers are called ... (1)

A) prime
B) relatively prime (co-prime) ✓
C) square
D) consecutive

> **Answer: B** — 8 and 9 share no factor except 1, yet neither is prime.
> - **A** — 8 and 9 are co-prime and neither is prime
> - **C** — nothing about squares is implied
> - **D** — 8 and 15 are co-prime and not consecutive

1.8 The LCM of 6, 8 and 12 is ... (1)

A) 2 **B)** 576

C) 48 **D) 24 ✓**

> **Answer: D** — 24 is the smallest number all three divide into.
> - **A** — that is the HCF
> - **B** — multiplied all three together
> - **C** — a common multiple, but not the lowest

1.9 12 tins and 18 boxes must be packed into identical groups with none left over. The greatest number of groups is ... (1)

A) 30 **B)** 36

C) 3 **D) 6 ✓**

> **Answer: D** — The greatest number of equal groups is the HCF of 12 and 18, which is 6.
> - **A** — added the two numbers
> - **B** — that is the LCM
> - **C** — a common factor, but not the greatest

1.10 Which one of the following pairs has an LCM of 36? (1)

A) 9 and 12 ✓ **B)** 6 and 12

C) 8 and 9 **D)** 4 and 6

> **Answer: A** — The LCM of 9 and 12 is 36.
> - **B** — their LCM is 12
> - **C** — their LCM is 72
> - **D** — their LCM is 12

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]

Answer the questions below WITHOUT using a calculator. Show ALL your calculations.

2.1 Use prime factorisation to determine the HCF and the LCM of 48 and 36. (5)

> $48 = 2^4 \times 3$ *(1)*
> $36 = 2^2 \times 3^2$ *(1)*
> HCF $= 2^2 \times 3 =$ **12** *(1)*
> LCM $= 2^4 \times 3^2 =$ **144** *(2)*

2.2 Determine the HCF and the LCM of 92 and 146. **(5)**

> $92 = 2^2 \times 23$ and $146 = 2 \times 73$ *(2)*
> The only common prime is 2, to the power 1: HCF $= \mathbf{2}$ *(1)*
> LCM $= 2^2 \times 23 \times 73$ *(1)* $= \mathbf{6\,716}$ *(1)*

2.3 Show that HCF $\times$ LCM $= 48 \times 36$. **(2)**

> $12 \times 144 = 1\,728$ *(1)*
> $48 \times 36 = 1\,728$, so the two are equal *(1)*

QUESTION 3 [11 MARKS]

Answer the two word problems below. In each case state whether you used the HCF or the LCM.

3.1 Two bells ring at regular intervals, one every 15 minutes and the other every 20 minutes. They ring together at $08{:}00$. Determine the next TWO times at which they ring together. **(5)**

> This needs the **LCM** *(1)*
> $15 = 3 \times 5$ and $20 = 2^2 \times 5$ *(1)*
> LCM $= 60$ minutes *(1)*
> **09:00** *(1)* and **10:00** *(1)*

3.2 60 red beads and 48 blue beads are packed into identical packs, using as many packs as possible with none left over. Determine the number of packs and what each pack contains. **(4)**

> This needs the **HCF** *(1)*
> HCF of 60 and $48 = 12$ *(1)*
> **12 packs** *(1)*, each with 5 red and 4 blue beads *(1)*

3.3 Explain how you decide whether a word problem needs the HCF or the LCM. **(2)**

> The **HCF** is used when something is SPLIT into equal groups *(1)*; the **LCM** when events REPEAT and you need when they next coincide *(1)*

TOTAL: 33 marks

This question paper consists of 3 questions.

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