

7. What is the least common denominator for adding the fractions  $\frac{4}{15}$ ,  $\frac{1}{12}$ , and  $\frac{3}{8}$  ?

- A. 40
- B. 120
- C. 180
- D. 480
- E. 1,440

**10.** What is the prime factorization of 84?

**f.**  $42 \times 2$

**g.**  $7 \times 2 \times 3$

**h.**  $2^2 \times 3 \times 7$

**i.**  $2 \times 6 \times 7$

**j.**  $2^3 \times 7$

11 (a) Find the Highest Common Factor (HCF) of 75 and 90

.....  
(2)

(b) Find the Lowest Common Multiple (LCM) of 75 and 90

.....  
(2)

(d)  $A = 2^3 \times 3^4 \times 5^{16}$   
 $B = 2^5 \times 3 \times 7^{12}$

Find the Highest Common Factor of  $A$  and  $B$ .

.....  
**(2)**  
**(Total 6 marks)**



11

$3780 = 2^2 \times 3^3 \times 5 \times 7$	$3240 = 2^3 \times 3^4 \times 5$
---	----------------------------------

- (a) Find the highest common factor (HCF) of 3780 and 3240  
Give your answer as a product of prime factors.

.....  
(2)

- (b) Find the lowest common multiple (LCM) of 3780 and 3240  
Give your answer as a product of prime factors.

## Highest Common Factor (HCF)

- 1) Find the Highest Common Factor of 16 and 24.
  
- 2) Find the Highest Common Factor of 21 and 28.
  
- 3) Find the Highest Common Factor of 60 and 150.
  
- 4) Find the Highest Common Factor of 96 and 108.
  
- 5)
  - (i) Write 42 and 63 as products of their prime factors.
  - (ii) Work out the Highest Common Factor of 42 and 63.

## Lowest Common Multiple (LCM)

- 1) Find the Lowest Common Multiple of 20 and 60.
  
- 2) Find the Lowest Common Multiple of 28 and 72.
  
- 3) Find the Lowest Common Multiple of 70 and 240.
  
- 4) Find the Lowest Common Multiple of 35 and 55.
  
- 5)
  - (i) Write 42 and 63 as products of their prime factors.
  - (ii) Work out the Lowest Common Multiple of 42 and 63.

## Product of Primes/HCF/LCM

- 1) a) Express 84 as a product of its prime factors.  
b) Find the Highest Common Factor (HCF) of 84 and 35.

2) Express 72 as the product of its prime factors.

3) Express 180 as the product of its prime factors.

- 4) a) Express 66 as a product of its prime factors.  
b) Express  $132^2$  as a product of its prime factors.



5) Express 252 as a product of its prime factors.



6) Find the Lowest Common Multiple (LCM) of 24 and 36.



- 7) a) Write 56 as a product of its prime factors.  
b) Find the Highest Common Factor (HCF) of 56 and 42.



- 8) a) Express 45 as a product of its prime factors.  
b) Find the Highest Common Factor (HCF) of 45 and 30.



- 9) a) Find the Highest Common Factor (HCF) of 24 and 30.  
b) Find the Lowest Common Multiple (LCM) of 4, 5 and 6.



## Product of Prime Factors

- 1) List the first seven prime numbers.
  - 2) Express the following number as the product of their prime factors:  
a) 30                      b) 60                      c) 360                      d) 220
  - 3) Express the following number as the product of **powers** of their prime factors:  
a) 24                      b) 64                      c) 192                      d) 175
  - 4) The number 96 can be written as  $2^m \times n$ , where  $m$  and  $n$  are prime numbers.  
Find the value of  $m$  and the value of  $n$ .
  - 5) The number 75 can be written as  $5^x \times y$ , where  $x$  and  $y$  are prime numbers.  
Find the value of  $x$  and the value of  $y$ .
- 

## HCF and LCM

- 1) Find the Highest Common Factor (HCF) of each of these pairs of numbers.  
a) 16 and 24                      b) 21 and 28                      c) 60 and 150                      d) 96 and 108
- 2) Find the Least (or Lowest) Common Multiple (LCM) of each of these pairs of numbers.  
a) 16 and 24                      b) 21 and 28                      c) 60 and 150                      d) 96 and 108
- 3) a) Write 42 and 63 as products of their prime factors.  
b) Work out the HCF of 42 and 63.  
c) Work out the LCM of 42 and 63.
- 4) a) Write 240 and 1500 as products of their prime factors.  
b) Work out the HCF of 240 and 1500.  
c) Work out the LCM of 240 and 1500.

## Highest Common Factor (H.C.F.)



- A). The H.C.F. of two or more numbers is the biggest factor that belongs to all the numbers. One way to find this is to look at the prime factors.

E.g. Find the H.C.F. of 12 and 18.

Prime factors of 12  $2 \times 2 \times 3$

These factors belong in both sets.

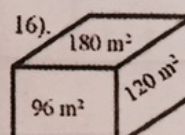
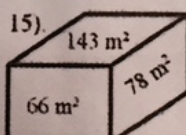
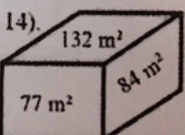
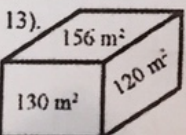
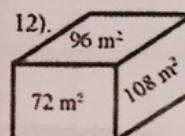
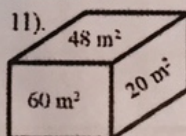
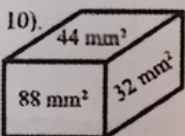
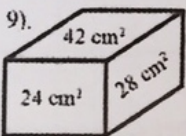
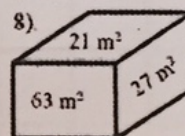
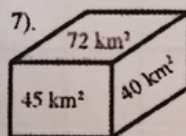
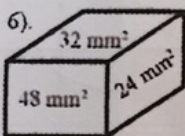
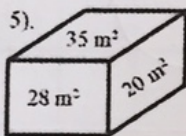
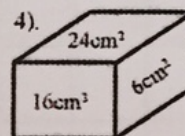
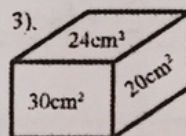
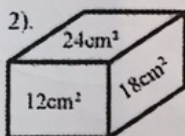
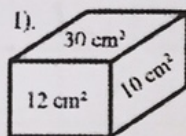
Prime factors of 18  $2 \times 3 \times 3$

The H.C.F is  $2 \times 3 = 6$ .

Find the H.C.F. of the following sets of numbers

- |                     |                     |                      |                      |
|---------------------|---------------------|----------------------|----------------------|
| 1). 12 and 18       | 2). 10 and 25       | 3). 14 and 21        | 4). 24 and 32        |
| 5). 30 and 24       | 6). 30 and 45       | 7). 48 and 36        | 8). 45 and 36        |
| 9). 48 and 72       | 10). 42 and 70      | 11). 105 and 63      | 12). 72 and 120      |
| 13). 18, 30 and 42  | 14). 24, 40 and 72  | 15). 27, 18 and 99   | 16). 104, 72 and 56  |
| 17). 36, 96 and 60  | 18). 42, 56 and 98  | 19). 90, 45 and 105  | 20). 36, 63 and 108  |
| 21). 63, 42 and 126 | 22). 108, 54 and 90 | 23). 72, 168 and 120 | 24). 144, 96 and 192 |

- B). Here are some cuboids. The areas of each face are given. (The diagrams are not drawn to scale). Work out the length, width and height of each cuboid.



### Lowest Common Multiple (L.C.M.)

The smallest multiple of two or more numbers is called the Lowest Common Multiple (L.C.M.).

E.g. Find the L.C.M. of 4 and 9.

Multiples of 4

4, 8, 12, 16, 20, 24, 28, 32, 36, 40 ...

Multiples of 9

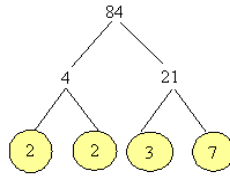
9, 18, 27, 36, 45 .....

The L.C.M. of 4 and 9 is 36.

Find the Lowest Common multiple of the following sets of numbers.

- |                   |                    |                   |                    |
|-------------------|--------------------|-------------------|--------------------|
| 1). 3 and 4       | 2). 5 and 7        | 3). 6 and 9       | 4). 4 and 7        |
| 5). 8 and 12      | 6). 10 and 15      | 7). 12 and 9      | 8). 10 and 12      |
| 9). 20 and 15     | 10). 12 and 18     | 11). 15 and 25    | 12). 16 and 24     |
| 13). 3, 4 and 5   | 14). 2, 3 and 5    | 15). 3, 4 and 8   | 16). 2, 4 and 9    |
| 17). 5, 8 and 10  | 18). 3, 9 and 12   | 19). 4, 12 and 16 | 20). 8, 12 and 20  |
| 21). 5, 12 and 24 | 22). 15, 20 and 24 | 23). 8, 15 and 20 | 24). 15, 18 and 30 |

- 5** **a** Write 24 and 60 as products of their prime factors.  
**b** Find the HCF of 24 and 60. **c** Find the LCM of 24 and 60.
- 6** **a** Write 72 and 120 as products of their prime factors.  
**b** Find the HCF of 72 and 120. **c** Find the LCM of 72 and 120.
- 7** Find the HCF and LCM of the following pairs of numbers.  
**a** 36 and 90 **b** 54 and 72 **c** 60 and 96 **d** 144 and 180
- 8**  $x = 2 \times 3^2 \times 5$ ,  $y = 2^3 \times 3 \times 7$   
**a** Find the HCF of  $x$  and  $y$ . **b** Find the LCM of  $x$  and  $y$ .

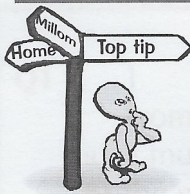


## Highest Common Factor (HCF) and Lowest Common Multiple (LCM) Worksheet

1. Find the **HCF** of
  - a. 18 and 12
  - b. 14 and 70
  - c. 108 and 78
  - d. 256 and 96
  - e. 42 and 140
  - f. 390 and 26
  - g. 380 and 38
  - h. 18 and 8
  - i. 210 and 100
  
2. Find the **LCM** of
  - a. 6 and 9
  - b. 24 and 32
  - c. 12 and 18
  - d. 21 and 70
  - e. 38 and 380
  - f. 39 and 260
  - g. 128 and 48
  - h. 54 and 78
  - i. 28 and 140
  
3. What is 250 written in index form?
  
4. Find the integers **a**, **b** and **c** when  $300 = 2^a \times 3^b \times 5^c$
  
5. There are 2 people, A and B, running in a circle. A completes one revolution in 4 minutes and B completes one revolution in 7 minutes. They start running together, after how much time will A and B meet at the starting point?
  
6. Two lighthouses can be seen from the top of a hill. The first flashes once every 8 seconds, and the other flashes once every 15 seconds. If they flash at the same time, how long will it be until they flash at the same time again?
  
7. Billy wants to cut identical squares as big as he can from a piece of paper 168 mm by 196 mm. What is the length of each square?



# LCM and HCF



These two fancy names always put people off — but really they're dead easy. Just learn these simple facts:

1) The Lowest Common Multiple (LCM) is the **SMALLEST** number that will **DIVIDE BY ALL** the numbers in question.

E.g. 3, 6, 9, 12, 15 are all multiples of 3.  
5, 10, 15, 20, 25 are all multiples of 5.  
The lowest number that is in both lists is 15, so 15 is the LCM of 3 and 5.

2) The Highest Common Factor (HCF) is the **BIGGEST** number that will **DIVIDE INTO ALL** the numbers in question.

E.g. 1, 2, 4, 8 are all factors of 8.  
1, 2, 3, 4, 6, 12 are all factors of 12.  
The highest number that is in both lists is 4, so 4 is the HCF of 8 and 12.

- Q1 a) List the first ten multiples of 6, starting at 6.  
b) List the first ten multiples of 5, starting at 5.  
c) What is the LCM of 5 and 6?

- Q2 a) List all the factors of 30.  
b) List all the factors of 48.  
c) What is the HCF of 30 and 48?

Q3 For each set of numbers find the HCF.

- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| a) 40, 60         | d) 15, 45         | g) 32, 64         |
| b) 10, 40, 60     | e) 15, 30, 45     | h) 32, 48, 64     |
| c) 10, 24, 40, 60 | f) 15, 20, 30, 45 | i) 16, 32, 48, 64 |

Q4 For each set of numbers find the LCM.

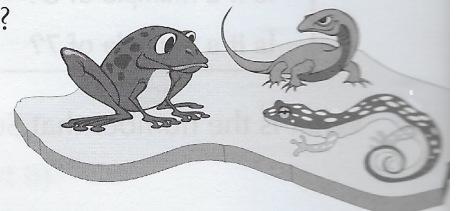
- |                   |                   |                   |
|-------------------|-------------------|-------------------|
| a) 40, 60         | d) 15, 45         | g) 32, 64         |
| b) 10, 40, 60     | e) 15, 30, 45     | h) 32, 48, 64     |
| c) 10, 24, 40, 60 | f) 15, 20, 30, 45 | i) 16, 32, 48, 64 |

Q5 Lars, Rita and Alan regularly go swimming. Lars goes every 2 days, Rita goes every 3 days and Alan goes every 5 days. They all went swimming together on Friday 1st June.

- a) On what date will Lars and Rita next go swimming together?  
b) On what date will Rita and Alan next go swimming together?  
c) On what day of the week will all 3 next go swimming together?  
d) Which of the 3 (if any) will go swimming on 15th June?

I tell you what, it's a lot easier to find the LCM or HCF once you've listed the multiples or factors. If you miss out this step it'll all go horribly wrong, believe me.

This is just a LCM question in disguise.



17. Matthew reads at an average rate of 30 pages per hour, while Alex reads at an average rate of 40 pages per hour. If Matthew starts reading a novel at 4:30 PM, and Alex begins reading the same novel at 5:20 PM, at what time will they be reading the same page?

Answer ..... [3 marks]