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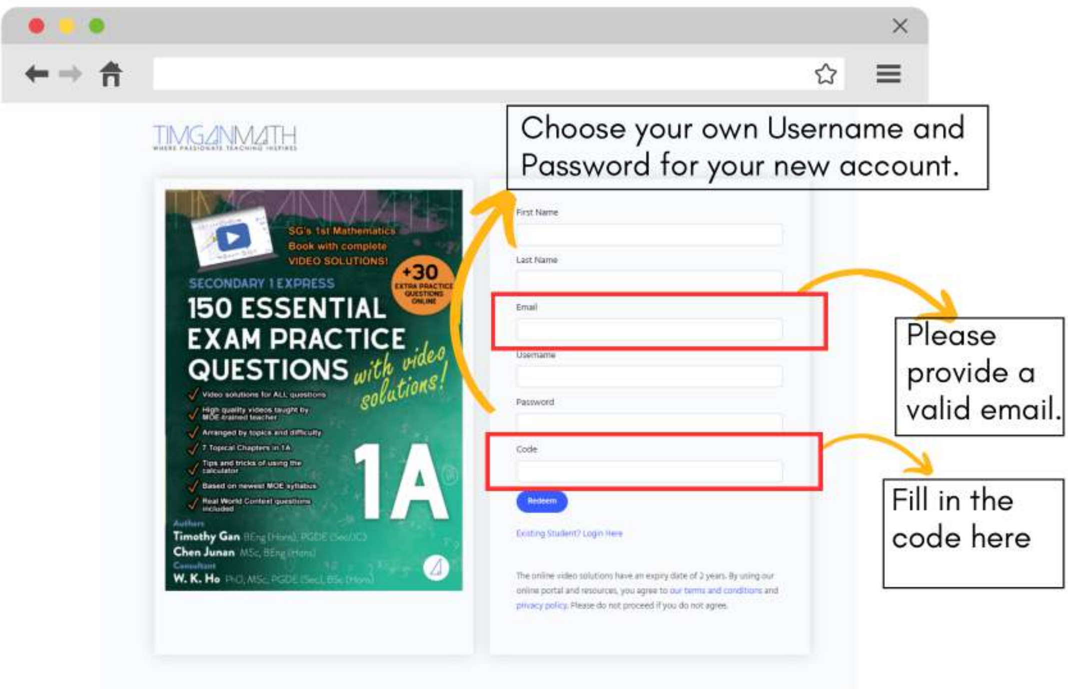

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PREFACE

Secondary 1 Express 150 Essential Exam Practice Questions is the first of a two-book series specially written for Secondary 1 students to prepare for their various continual assessments and semestral assessments in Mathematics. The materials in this book follow closely to the latest Mathematics syllabus implemented by the Ministry of Education, containing the first 7 units of the Secondary 1 curriculum. These materials are relevant for students in both the 'O' Level and Integrated Programme (IP) tracks and serve to provide a concise yet complete essential collection of practice questions that a student needs to fully comprehend each given topic bounded by the syllabus.

This book has the following features:

- **Key Concepts**
  We start each unit with important learning objectives clearly stated to guide students in their understanding of the topics. This is followed by summary of the essential concepts for the topics as a quick revision guide for students to consolidate their learning before attempting the practice questions.

- **Basic Questions, Intermediate Questions and Advanced Questions**
  The **Basic Questions** in this section tackles the foundational concepts for each topic. Mastering these questions is vital to ensure proper foundation of the topic is set. When a student gains confidence by completing the Basic Questions, they can move on to **Intermediate Questions** which builds upon their foundation in the topic while introducing another layer of problem solving. To further challenge and stretch the student's thinking skills, they are encouraged to attempt the **Advanced Questions** to ensure full mastery of the topic(s) presented in the question.

- **Problems in Real-World Context (P.R.W.C.) Questions**
  Some of the practice questions in this book are problems in Real-World Contexts and are denoted by the following badge:

- **Higher Order Thinking (H.O.T.) Questions**
  Some of the practice questions in this book are Higher Order Thinking questions and are denoted by the following badge:

Students will find this book handy when they need to supplement their Mathematics learning with additional practice questions to prepare for their tests and examinations. With thorough practice, students are sure to gain a stronger mastery in the subject and increase their confidence when it comes to Mathematics assessments.

CONTENTS

UNIT 1: PRIMES, HCF AND LCM

Scan for video solutions and extra practice questions!

SUMMARY

LEARNING OBJECTIVES

(i) Understand the definition of prime numbers and composite numbers.

(ii) Determine whether a whole number is prime or composite.

(iii) Express a composite number as the product of its prime factors, i.e., perform the prime factorisation.

(iv) Solve problems involving perfect square, perfect cube, square root, or cube root using prime factorisation.

(v) Find the highest common factor (HCF) and the lowest common multiple (LCM) of two or more whole numbers.

(vi) Solve problems involving the real-world applications of prime numbers, HCF and LCM.

ESSENTIAL CONCEPTS

(i) **Prime Numbers, Composite Numbers and Prime Factorisation (Questions 1 – 4)**

(a) A **prime number** is a whole number that has <u>exactly two</u> different factors, 1 and itself.

(b) A **composite number** is a whole number that has <u>more than two</u> different factors.

(c) Special cases:

1 is neither a prime number nor a composite number;

2 is the first prime number, and the only prime number that is an even number.

(d) **Prime factor(s)** of a whole number is/are its factor(s) that is/are prime number(s).

(e) Method to determine whether a whole number is a prime number or not:

Test whether each prime number that is less than or equal to the square root of the given whole number is a factor of it or not. If none of these prime numbers is a factor of the given number, then this number is a prime number; Otherwise, it is a composite number.

(f) **Prime factorisation** of a whole number is the process of expressing the number as the product of its prime factors. If possible, prime factorisation of a whole number is usually expressed in **index notation**.

Figure 1.1 is an example of finding the prime factorisation of 18 using long division.

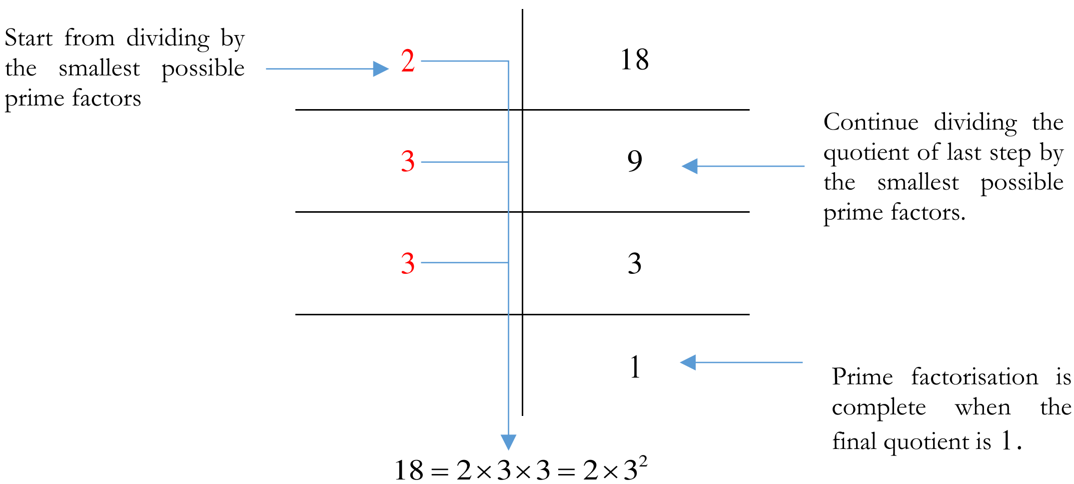

Figure 1.1 Finding the Prime Factorisation of 18 Using Long Division

(ii) Highest Common Factor and Lowest Common Multiple (Questions 5 – 8, 23 – 25)

(a) Methods to find the **highest common factor (HCF)** of two or more numbers:

1. **By Prime Factorisation**:

Find the prime factorisation of each number in index notation;

Then the HCF of these numbers is the product of the common prime factors that are each to the lowest power in the prime factorisations.

2. **By Long Division.**

Start from dividing each number by the smallest common prime factors, until there are no common prime factors for all of the numbers.

Then the HCF of these numbers is the product of the common prime factors on the left.

(b) Methods to find the **lowest common multiple (LCM)** of two or more numbers:

1. **By Prime Factorisation**:

Find the prime factorisation of each number in index notation;

Then the LCM of these numbers is the product of all of the prime factors that are each to the highest power in the prime factorisations.

2. **By Long Division.**

Start from dividing each number by the smallest common prime factors, until there are no common prime factors for any two of the numbers.

Then the LCM of these numbers is the product of the common prime factors on the left and all of the remaining factors.

(iii) Square Roots and Cube Roots Involving Prime Factorisation (Questions 9 – 14)

(a) A number that is the square of a whole number is known as a **perfect square** (or **square number**).

Correspondingly, a number whose square is a given number is known as the **square root** of the given number, denoted by the square root symbol "$\sqrt{\ }$".

(b) A number that is the cube of a whole number is known as a **perfect cube** (or **cube number**).

Correspondingly, a number whose cube is a given number is known as the **cube root** of the given number, denoted by the cube root symbol "$\sqrt[3]{\ }$".

(c) Prime factorisation can be used to determine the square/cube root of a given number or determine whether a given number is a perfect square/cube or not.

(iv) Applications of HCF and LCM (Questions 15 – 22, 26)

Finding the HCF and LCM of numbers are applied under many real-world situations to evaluate the numerical property of data or provide us with quantitative reference in decision-making. For more specific real-world applications of HCF and LCM, see questions of this unit.

Basic Questions

1. (a) List all the prime numbers less than 50.
   (b) Determine whether the following numbers are prime or composite.
   (i) 85
   (ii) 71
   (iii) 211
   (iv) 2343
   (v) 3119

2. Find the prime factorisation of
   (a) 480,
   (b) 864,
   (c) 1205,
   leaving your answer in index notation.

3. Find the prime factorisation of
   (a) 560,
   (b) 645,
   (c) 2305,
   leaving your answer in index notation.

4. Find the prime factorisation of
   (a) 2400,
   (b) 5300,
   (c) 6850,
   leaving your answer in index notation.

5. Find the highest common factor and lowest common multiple of the following
   (a) $2^3 \times 5^2 \times 7 \times 13^3$ and $2^5 \times 3 \times 5 \times 7^3 \times 11$,
   (b) $3^3 \times 7^3 \times 13^4 \times 17^2 \times 23$ and $2 \times 3^2 \times 5 \times 7^4 \times 11^2 \times 13^2 \times 17$,
   (c) $2^6 \times 3^2 \times 5^2 \times 7 \times 11^3$ and $2^4 \times 3 \times 5 \times 11^2 \times 17^2$,
   leaving your answers in index notation.

6. Find the highest common factor and lowest common multiple of the following
   (a) 5600 and 8400,
   (b) 1500 and 394,
   (c) 8905 and 1504.

Intermediate Questions

7. Find the highest common factor and lowest common multiple of the following
   (a) $5^2 \times 7^4 \times 11^3 \times 13^2 \times 17$, $2^5 \times 3^2 \times 5^2 \times 7$ and $2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17$,
   (b) $2^3 \times 5^2 \times 7 \times 13 \times 17^2$, $3^4 \times 5^2 \times 11^2 \times 13^2 \times 17$ and 9750,
   (c) 780, 1350 and 3510,
   leaving your answer in index notation.

8. Using prime factorisation, find
   (a) $\sqrt{90\ 000}$,
   (b) $\sqrt{99\ 225}$.

9. Find
   (a) $\sqrt[3]{125\ 000}$,
   (b) $\sqrt[3]{250\ 047}$,
   by using prime factorisation.

10. Written as a product of its prime factors, $50\ 960 = 2^4 \times 5 \times 7^2 \times 13$.
    Find the smallest positive integer k such that
    (a) $\dfrac{50\ 960}{k}$ is a perfect cube,
    (b) $50\ 960k$ is a perfect square.

11. The numbers 1680 and $14\ 850$, expressed as the product of their prime factors, are $1680 = 2^4 \times 3 \times 5 \times 7$ and $14\ 850 = 2 \times 3^3 \times 5^2 \times 11$.
Hence find
(a) the largest integer which is a factor of 1680 and $14\ 850$,
(b) the smallest positive integer k, such that $14\ 850k$ is a perfect square,
(c) the smallest positive integer m, such that $1680 \times 14\ 850 \times m$ is a perfect cube.

12. (a) Express $11\ 250$ as the product of its prime factors.
(b) Find the smallest whole number k such that $\sqrt[3]{11\ 250k}$ is an integer.
(c) Find the smallest whole number q such that $11\ 250q$ is a multiple of 450.

13. (a) Express $272\ 250$ as the product of its prime factors.

(b) Find the smallest positive integer k such that $\sqrt{\dfrac{272\ 250}{k}}$ is an integer.

(c) Find the smallest positive integer q such that $272\ 250\,q$ is a multiple of 350.

14. 195 boys and 225 girls were involved in a fundraising event.

The boys are divided into groups, and so are the girls in such a way that the sizes of all the groups for both genders are equal.

(a) Find the greatest possible number of groups that can be formed.

(b) Find the size of each group.

15. 150 boys and 175 girls are going to a school sporting event.

    The boys and girls are respectively divided into groups such that each group has the same number of children of one gender.

    (a) What is the largest number of groups that can be formed?

    (b) What is the size of each group?

16. The traffic lights at two road junctions flash at regular intervals. One light flashes every 52 seconds and the other flashes every 42 seconds. The two lights flash together at 4 p.m. At what time, to the nearest minute, will they next flash together?

17. A conference is attended by 660 participants from Country A, 720 participants from Country B and 980 participants from Country C. Participants are distributed into groups with each group consisting an equal number of participants from each country.
    (a) What is the greatest number of groups that can be formed?
    (b) How many participants are from Country A, Country B and Country C in each group?

18. Arthur has 3 pieces of rope with lengths of 36 cm, 144 cm and 252 cm.

    He wishes to cut the 3 pieces of rope into smaller pieces of rope of equal length with no remainders.
    (a) What is the greatest possible length of the cut rope?
    (b) With the given length found in (a), find the number of pieces of those ropes that he can obtain?

19. Cakes were sold at $ 5.60 per slice, muffins were sold at $ 1.60 each and cookies were sold at $ 0.90 each. The bakery hopes to earn an equal amount of money from the sales of each food item each day.
    (a) What is the minimum amount of money he could earn for each item?
    (b) How many muffins did he sell?

Advanced Questions

20. Given that the lowest common multiple of 30, 126 and p is 4410, where p is a whole number.
    Find the smallest value of p.

21. A pair of whole numbers are such that their highest common factor is 150 and lowest common multiple is 600. Find all possible such pairs if all the numbers are at least 120.

22. When x marbles are packed into bags of 10, 22 or 25, there always remain 3 marbles not packed into any of the bags.

    What is the smallest possible value of x?

SUGGESTED ANSWERS

UNIT 1 PRIMES, HCF AND LCM

1. (a) Prime numbers less than 50 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47.

(b) (i) The unit digit of 85 is 5, and so it is divisible by 5.
$\therefore 85$ is a composite number.

(ii) 2, 3, 5, 7, 11 test till $\sqrt{71} = 8.4$ (1 d.p.)
Since 71 has only two factors, i.e., 71 and 1.
Thus, 71 is a prime number.

(iii) Test till $\sqrt{211} = 14.5$ (1 d.p.)
2, 3, 5, 7, 11, 13, 17, 19, ..
Since 211 has only two factors, i.e., 211 and 1.
Thus, 211 is a prime number.

(iv) The sum of all digits is divisible by 3, and hence the number is divisible by 3.
Thus, 2343 is a composite number.

> Handy Tip: We avoid square root test here as this is a quicker way to determine if a number is divisible by 3.

(v) Test till $\sqrt{3119} = 55.8$ (1 d.p.).
Since 3119 has only two factors, i.e., 3119 and 1.
Thus, 3119 is a prime number.

> Handy Tip: For Questions 2, 3 and 4, it is good practice to write the prime factorisation in index notation, i.e., in such a way that the prime bases are arranged in ascending order. The Fundamental Theorem of Arithmetic states that the prime factorisation of a positive integer greater than 1 is unique, up to the ordering of prime bases.

2. (a) Prime factors: ~~2~~, ~~3~~, ~~5~~, 7, 11, 13, 17, ...

2	480
2	240
2	120
2	60
2	30
3	15
5	5
	1

$\therefore 480 = 2^5 \times 3 \times 5$

(b) Prime factors: ~~2~~, 3, 5, 7, 11, ...

2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

$\therefore 864 = 2^5 \times 3^3$

(c) Prime factors: ~~2~~, ~~3~~, ~~5~~, ~~7~~, ~~11~~, 13, ...

5	1205
241	241
	1

$\therefore 1205 = 5 \times 241$

> Handy Tip:
> Use square root test to check prime number. Note that 241 passes the square root test for primality and hence is prime. Similar to Q3 (c).

3. (a) Prime factors: ~~2~~, ~~3~~, ~~5~~, 7, 11, 13, ...

2	560
2	280
2	140
2	70
5	35
7	7
	1

$\therefore 560 = 2^4 \times 5 \times 7$

(b) Prime factors: ~~2~~ , ~~3~~ , ~~5~~ , 7 , 11 , 13 , …

3	645
5	215
43	43
	1

$\therefore 645 = 3 \times 5 \times 43$

(c) Prime factors: ~~2~~ , ~~3~~ , ~~5~~ , ~~7~~ , ~~11~~ , ~~13~~ , ~~17~~ , ~~19~~ , ~~23~~ , …

5	2305
461	461
	1

Handy Tip:
By square root test 461 is prime.

$\therefore 2305 = 5 \times 461$

4. (a) Prime factors: ~~2~~ , ~~3~~ , 5 , 7 , 11 , 13 , …

2	2400
2	1200
2	600
2	300
2	150
3	75
5	25
5	5
	1

$\therefore 2400 = 2^5 \times 3 \times 5^2$

(b) Prime factors: ~~2~~ , ~~3~~ , 5 , 7 , 11 , …

2	5300
2	2650
5	1325
5	265
53	53
	1

$\therefore 5300 = 2^2 \times 5^2 \times 53$

(c) Prime factors: ~~2~~ , ~~3~~ , 5 , 7 , 11 , …

2	6850
5	3425
5	685
137	137
	1

Handy Tip:
By square root test 137 is prime.

$\therefore 6850 = 2 \times 5^2 \times 137$

5. (a)

$$2^3 \qquad \times 5^2 \times 7 \qquad \times 13^3$$
$$2^5 \times 3 \times 5 \times 7^3 \times 11$$

$\text{HCF} = 2^3 \times 5 \times 7$

$\text{LCM} = 2^5 \times 3 \times 5^2 \times 7^3 \times 11 \times 13^3$

Handy Tip:
The algorithm for computing the HCF and LCM of given natural numbers is as follows:
For HCF, list down the common prime factors, and enter the minimum of the exponents for each prime base.
For LCM, list down all the prime factors present, and enter the maximum of the exponents for each prime base.
It is useful to know that for any two natural numbers m and n, it always holds that HCF $\times$ LCM $= m \times n$.
This is not true for three natural numbers.

(b)

$$3^3 \times \qquad 7^3 \times \qquad 13^4 \times 17^2 \times 23$$
$$2 \times 3^2 \times 5 \times 7^4 \times 11^2 \times 13^2 \times 17$$

$\text{HCF} = 3^2 \times 7^3 \times 13^2 \times 17$

$\text{LCM} = 2 \times 3^3 \times 5 \times 7^4 \times 11^2 \times 13^4 \times 17^2 \times 23$

(c)

$$2^6 \times 3^2 \times 5^2 \times 7 \times 11^3$$
$$2^4 \times 3 \times 5 \times \qquad 11^2 \times 17^2$$

$\text{HCF} = 2^4 \times 3 \times 5 \times 11^2$

$\text{LCM} = 2^6 \times 3^2 \times 5^2 \times 7 \times 11^3 \times 17^2$

6. (a) $5600 = 2^5 \times \quad 5^2 \times 7$

$8400 = 2^4 \times 3 \times 5^2 \times 7$

$\text{HCF} = 2^4 \times 5^2 \times 7 = 2800$

$\text{LCM} = 2^5 \times 3 \times 5^2 \times 7 = 16\ 800$

(b) $1500 = 2^2 \times 3 \times 5^3$

$394 = 2 \qquad \times 197$

$\text{HCF} = 2$

$\text{LCM} = 2^2 \times 3 \times 5^3 \times 197$

$= 295\ 500$

(c) $8905 = 5 \times 13 \times 137$

$1504 = 2^5 \times 47$

$\text{HCF} = 1$

$\text{LCM} = 2^5 \times 5 \times 13 \times 47 \times 137$

$= 13\ 393\ 120$

7. (a)

$$\begin{array}{l} \quad\quad\quad 5^2\times 7^4\times 11^3\times 13^2\times 17 \\ 2^5\times 3^2\times 5^2\times 7 \\ 2\times\ 3\times\ 5\ \times 7\times\ 11\times 13\times 17 \\ \hline \end{array}$$

$\text{HCF} = 5\times 7$

$\text{LCM} = 2^5\times 3^2\times 5^2\times 7^4\times 11^3\times 13^2\times 17$

(b)

$$\begin{array}{l} \quad\quad 2^3\times\ 5^2\times 7\times\ 13\times 17^2 \\ \quad\quad 3^4\times 5^2\times\quad 11^2\times 13^2\times 17 \\ 9750 = 2\times 3\times 5^3\times\quad\quad 13 \\ \hline \end{array}$$

$\text{HCF} = 5^2\times 13$

$\text{LCM} = 2^3\times 3^4\times 5^3\times 7\times 11^2\times 13^2\times 17^2$

(c) $780 = 2^2\times 3\times 5\times 13$

$$\begin{array}{l} 1350 = 2\times 3^3\times 5^2 \\ 3150 = 2\times 3^3\times 5\times 13 \\ \hline \end{array}$$

$\text{HCF} = 2\times 3\times 5$

$\text{LCM} = 2^2\times 3^3\times 5^2\times 13$

8. (a) $90\ 000 = 2^4\times 3^2\times 5^4$

$\sqrt{90\ 000}$

$= \sqrt{2^2\times 2^2\times 3^2\times 5^2\times 5^2}$

$= \sqrt{\left(2^2\times 3\times 5^2\right)\left(2^2\times 3\times 5^2\right)}$

$= 2^2\times 3\times 5^2 = 300$

> Handy Tip:
> Note that square-rooting involves extracting half the number of existing powers of primes. This leads to the next remark that a natural number is a perfect square if and only if the existing powers of primes are all even.

(b) $99\ 225 = 3^4\times 5^2\times 7^2$

$\sqrt{99\ 225}$

$= \sqrt{3^4\times 5^2\times 7^2}$

$= 3^2\times 5\times 7 = 315$

9. (a) $125\ 000 = 2^3\times 5^6$

$\sqrt[3]{125\ 000}$

$= \sqrt[3]{2^3\times 5^6}$

$= \left(2\times 5^2\right) = 50$

> Handy Tip:
> Cube-rooting involves extracting $\frac{1}{3}$ the existing powers of primes.
> Consequently, a natural number is a perfect cube if and only if all existing powers of primes are multiples of 3.

(b) $250\ 047 = 3^6\times 7^3$

$\sqrt[3]{250\ 047}$

$= \sqrt[3]{\left(3^2\times 7\right)\left(3^2\times 7\right)\left(3^2\times 7\right)}$

$= 3^2\times 7 = 63$

10. (a) $\frac{50\ 960}{k} = \frac{2^4\times 5\times 7^2\times 13}{2\times 5\times 7^2\times 13} = 2^3$

$\therefore$ smallest positive integer k

$= 2\times 5\times 7^2\times 13 = 6370$

(b) $50\ 960k = 2^4\times 5\times 7^2\times 13\times k$

$= 2^4\times 5^2\times 7^2\times 13^2$

$\therefore$ smallest positive integer k

$= 5\times 13 = 65$

11. (a)

$$\begin{array}{l} 1680 = 2^4\times 3\ \times 5\ \times 7 \\ 14\ 850 = 2\ \times 3^3\times 5^2\quad \times 11 \\ \hline \end{array}$$

$\text{HCF} = 2\times 3\times 5$

$= 30$

(b) $14\ 850k = 2^1\times 3^3\times 5^2\times 11\times k$

$= 2^2\times 3^4\times 5^2\times 11^2$

$\therefore$ smallest positive integer k

$= 2\times 3\times 11 = 66$

(c) $1680\times 14\ 850\times m$

$= \left(2^4\times 3\times 5\times 7\right)\left(2\times 3^3\times 5^2\times 11\right)\times m$

$= 2^6\times 3^6\times 5^3\times 7^3\times 11^3$

$= 2^5\times 3^4\times 5^3\times 7^3\times 11^3\times m$

$\therefore$ smallest positive integer m

$= 2\times 3^2\times 7^2\times 11^2 = 106\ 722$

12. (a) $11\ 250 = 2\times 3^2\times 5^4$

(b) $\sqrt[3]{11\ 250k}$ is an integer

$11\ 250k$ is a perfect cube.

$2\times 3^2\times 5^4 k = 2^3\times 3^3\times 5^6$

$k = 2^2\times 3\times 5^2$

$\therefore$ smallest whole number $k = 300$

(c) $\frac{11\ 250q}{450}$ is an integer

$\frac{11\ 250q}{450} = \frac{\cancel{2}\times\cancel{3^2}\times\cancel{5^4}^{\,2}q}{\cancel{2}\times\cancel{3^2}\times\cancel{5^2}}$

$= 5^2 q = 25q$

$\frac{11\ 250q}{450}$ is already a multiple of 450

$\therefore$ smallest whole number $= 1$

13. (a) $272\ 250 = 2\times3^2\times5^3\times11^2$

(b) $\frac{272\ 250}{k}$ is a perfect square.

$\frac{2^1\times3^2\times5^3\times11^2}{k} = 2^0\times3^2\times5^2\times11^2$

$k = 2\times5$

$\therefore$ smallest integer k is 10.

(c) $\frac{272\ 250q}{350}$ is a positive integer.

$\frac{2\times3^2\times5^3\times11^2\times q}{2\times5^2\times7}$

$\therefore$ smallest positive integer q is 7.

14. (a) $195 = 3\ \times5\times13$

$225 = 3^2\times5^2$

$\text{HCF} = 3\times5 = 15$

Greatest possible number of groups is 15.

(b) Number of girls in each group

$= \frac{225}{15} = 15$ girls

15. (a) $150 = 2\times3\times5^2$

$175 = \quad 5^2\times7$

$\text{HCF} = 5^2 = 25$

Largest number of groups is 25.

(b) No. of boys in a group $= \frac{150}{25} = 6$

No. of girls in a group $= \frac{175}{25} = 7$

Size of group $= 6+7 = 13$ students

16. $52 = 2^2\times13$

$42 = 2\times3\times7$

$\text{HCF} = 2^2\times3\times7\times13$

$= 1092$ seconds

1092 seconds $= \frac{1092}{60}$ minutes

$= 18.2$ minutes

$\therefore$ One of the lights flashes every 52 seconds and the other every 42 seconds.

17. (a) $660 = 2^2\times3\times5\times11$

$720 = 2^4\times3^2\times5$

$980 = 2^2\times5\times7^2$

$\text{HCF} = 2^2\times5 = 20$

$\therefore$ Greatest number of groups is 20.

(b) No. of participants from

Country $A = \frac{660}{20} = 33$

Country $B = \frac{720}{20} = 36$

Country $C = \frac{980}{20} = 49$

$\text{HCF} = 2^2\times3^2 = 36$

18. (a) $36 = 2^2\times3^2$

$144 = 2^4\times3^2$

$252 = 2^2\times3^2\times7$

$\therefore$ Greatest possible length is 36 cm.

(b) $\frac{36+144+252}{36} = \frac{432}{36} = 12$

$\therefore 12$ ropes.

19. (a) $560 = 2^4\times5\times7$

$160 = 2^5\times5$

$90 = 2\times3^2\times5$

$\text{LCM} = 2^5\times3^2\times5\times7$

$= 10\ 080¢ = \$100.80$

$\therefore$ Minimum amount of money is \$100.80.

(b) No. of muffins $= \frac{\$100.80}{\$1.60} = 63$

He sold 63 muffins.

20. $30 = 2\times3\times5$

$126 = 2\times3^2\quad\times7$

$p = \quad\quad 7^2$

$\text{LCM} = 4410 = 2\times3^2\times5\times7^2$

$\therefore$ Smallest value of p is $7^2 = 49$

21.

$x = 2\times3\times5^2$ $y = 2^3\times3\times5^2$	150 200	150 600
$\text{HCF} = 150 = 2\times3\times5^2$ $\text{LCM} = 600 = 2^3\times3\times5^2$		

1st pair : 150 and 200

2nd pair : 150 and 600

22. $10 = 2\times5$

$22 = 2\times11$

$25 = 5^2$

Smallest $x-3 = 550 \Rightarrow x = 553$

$\therefore$ Smallest possible value of x is 553.