Elementary Mathematics

Revision Questions

Prime Numbers, HCF and LCM

Q1. Find the prime factorisation of each of the following numbers, expressing your answers in index notation.

(a) 315

(b) 1575

(c) 4356

Q2. Find the Highest Common Factor (HCF) of each of the following sets of numbers.

(a) 55 and 605

(b) 126 and 567

(c) 36, 72 and 135

(d) 30, 75 and 225

Q3. Find the Lowest Common Multiple (LCM) of each of the following sets of numbers.

(a) 36 and 90

(b) 56 and 126

(c) 48, 108 and 126

(d) 126, 168 and 756

Q4. Using prime factorisation, find

(a) $\sqrt{676}$

(b) $\sqrt{1296}$

(c) $\sqrt[3]{4096}$

(d) $\sqrt[3]{1728}$

Q5. (a) Express 3375 and 8100 as a product of prime factors, leaving your answer in index notation.

(b) Hence,

(i) find the HCF of 3375 and 8100,

(ii) evaluate $\sqrt[3]{3375}$ and $\sqrt{8100}$,

(iii) state the LCM of $\sqrt[3]{3375}$ and $\sqrt{8100}$.

Q6. (a) Express 3675 as a product of its prime factors, giving your answer in index notation.

(b) Hence, state the smallest integer value of n such that $3675n$ is a perfect square.

Q7. (a) Find the smallest positive integer value of n for which $63n$ is a multiple of 49.

(b) Find the smallest integer p, such that $126p$ is a perfect square.

Q8. (a) Find the smallest integer p such that $42p$ is a multiple of the number, $2 \times 3^2 \times 5$.

(b) Find the smallest integer k such that $\frac{1440}{k}$ is a perfect square.

Q9. Three chimes ring at intervals of 15 minutes, 40 minutes and 1 hour respectively. If the chimes first rang together at 7.45 a.m., calculate the next time that they will ring together again.

Q10. (a) Express 108 as a product of its prime factors.

(b) Hence, find

(i) the HCF of 504 and 108,

(ii) the LCM of 504 and 108,

(iii) the smallest integer p such that $504p$ is a perfect cube,

(iv) the smallest integer n such that $108n$ is a multiple of 504.

Q11. (a) Express 129600 as a product of its prime factors.

(b) Using your answer to (a), explain why 129600 is a perfect square.

(c) Given that p and q are prime numbers, find the values of p and q such that $\frac{129600p}{q}$ is a perfect cube.

Q12. Two numbers a and b, written as the products of their prime factors, are $a = 2^2 \times 11^2$ and $b = 2 \times 3^2 \times 11$.

(a) Find the value of $\sqrt[3]{\frac{3ab}{1000}}$.

(b) What is the smallest positive integer n for which $30n$ is a multiple of b ?

Q13. (a) Given that the LCM of $15, x$ and 105 is 525 . Find two possible values of x that lies between 15 and 105.

(b) If the HCF of two numbers is 60 and their sum is 480 , find all possible pairs of numbers.

Q14. The floor of a studio unit is to be laid with identical square tiles. If the dimension of the floor is 4.8 m by 6.4 m, find

(a) the largest possible length in cm of the side of each tile,

(b) the number of tiles required to fully lay the whole floor.

Q15. The HCF and LCM of three numbers are 12 and $2^3 \times 3^3 \times 11$ respectively. If two of the numbers are 108 and 72 , find the smallest possible value of the third number, leaving your answer as a product of prime factors in index notation.

Q16. When a packet of x sweets is divided into bags of 15,36 or 45 , there is always a remainder of 5 sweets. What is the smallest possible value of x?

Q17. Ali has x apples. If he divides the apples among 4 boys, 5 boys or 9 boys, the remainder is 3,4 and 8 apples respectively. What is the smallest possible value of x?

Q18. A company packs 1144 boxes of chocolates, 352 packets of juice and 572 sandwiches into as many goodie bags as possible for their employees. The number of boxes of chocolates, packets of juice and sandwiches are divided equally among all goodie bags.

a) What is the maximum number of goodie bags that can be prepared?

b) How many boxes of chocolate, packets of juice and sandwiches are found in each goodie bag?

Q19. A realm of ribbons was shared equally among four tailors. They cut their ribbons into 5cm, 8cm, 12cm and 16cm pieces respectively. To minimize wastage, they needed to ensure that there was no leftover after the cutting. What was the total length of the original ribbon?

Q20. Peter has 540 one-centimetre cubes. He arranges all of the cubes into a cuboid. The perimeter of the top of the cuboid is 28 cm. Find the dimensions of the cuboid.

Answers

Q1. (a) $3^2 \times 5 \times 7$, (b) $3^2 \times 5^2 \times 7$, (c) $2^2 \times 3^2 \times 11^2$

Q2. (a) 55, (b) 63, (c) 9, (d) 15

Q3. (a) 180, (b) 504, (c) 3024, (d) 1512

Q4. (a) 26, (b) 36, (c) 16, (d) 12

Q5. (a) $3375 = 3^3 \times 5^3; 8100 = 2^2 \times 3^4 \times 5^2$, (b) (i) 675, (b) (ii) 15 and 90, (b) (iii) 90

Q6. (a) $3675 = 3 \times 5^2 \times 7^2$, (b) 3

Q7. (a) 7, (b) 14

Q8. (a) 15, (b) 10

Q9. 9.45 a.m.

Q10. (a) $108 = 2^2 \times 3^3$, (b)(i) 36, (b)(ii) 1512, (b)(iii) 147, (b)(iv) 14

Q11. (a) $2^6 \times 3^4 \times 5^2$, (c) $p = 5, q = 3$

Q12. (a) 6.6, (b) 33

Q13. (a) 25 and 75, (b) 60,420 and 300,180

Q14. (a) 160 cm, (b) 12 tiles

Q15. $2^2 \times 3 \times 11$

Q16. 175

Q17. 179

Q18. a) 44 goodie bags, (b) 26 boxes of chocolate, 8 packets of juice, 13 sandwiches

Q19. 960cm

Q20. 12 cm by 9 cm by 5 cm