

Name: _____

Date: _____

Unit 1: Prime Factorisation/HCF & LCM

Test Your Knowledge 1:
Duration: 25 mins

15

2024 BUKIT VIEW SECONDARY SCHOOL S1 EOY P1 Q7 [2 Marks]

1

It is given that $2646 = 2 \times 3^3 \times 7^2$.

(a) Express 180 as the product of its prime factors.

Answer..... [1]

(b) It is given that $2646k$ is a perfect square, where k is a positive integer. Find the smallest possible value of k .

Answer..... [1]

2022 QUEENSWAY SECONDARY SCHOOL S1 EOY P1 Q1 [2 Marks]

2

(a) Explain why 324 is a perfect square.

Answer _____ [1]

(b) Find the smallest value of k given that $\frac{324}{k}$ is a perfect cube.

Answer $k =$ [1]

2021 PUNGGOLSECONDARY SCHOOL S2 EOY P1 Q7c [1 Mark]

- 3 Find the smallest whole number that is divisible by both 720 and 744, leaving your answer as a product of prime factors.

Answer [1]

2022 QUEENSWAY SECONDARY SCHOOL S1 EOY P2 Q2b [2 Marks]

- 4 There are three sirens, A, B and C on Happy Island. Siren A will sound off every 12 minutes, Siren B will sound off every 30 minutes and Siren C will sound off every 40 minutes. If they started sounding off at 8 am, what time will the three sirens sound off together at the same time again?

Answer [2]

2024 CRESCENT GIRLS S4 PRELIM P1 Q2 [2 Marks]

5

The following items are to be packed into gift bags for distribution to an old folks' home.

84 packets of cereals. 126 cans of baked beans. 168 packets of biscuits.

The items are to be packed such that the contents in each gift bag are the same and there are no leftovers. Find

- (a) the maximum number of gift bags required,

Answer [2]

2025 METHODIST GIRLS' S4 PRELIM P1 Q6 [3 Marks]

6

Written as a product of its prime factors, $240 = 2^4 \times 3 \times 5$ and $2750 = 2 \times 5^3 \times 11$.

- (i) Find the smallest positive integer n for which $\sqrt{2750n}$ is a whole number.

Answer [2]

7

Written as a product of its prime factors, $784 = 2^4 \times 7^2$.

The number $784 \div \frac{p}{q}$ is a perfect cube where p and q are prime numbers.

Find the value of p and the value of q .

Answer $p =$

$q =$ [2]

8

(a) State the perfect cube that is a factor of 540. [1]

Answer [1]

(b) Find the cube root of $\sqrt[3]{2744}$. Show your workings clearly [1]

Answer [1]

Answer:

Q1(a) $2^2 \times 3^2 \times 5$ (b) $2 \times 3 = 6$

Q2. Since $324 = 2^2 \times 3^4$, the power of all its prime factors are multiples of 2/ even.

(b) $k = 12$

Q3. $LCM = 2^4 \times 3^2 \times 5 \times 31$

Q4. LCM = 120 minutes, 10 am

Q5. 42

Q6. 110

(ii) LCM of 240 and 2750 = $2^4 \times 3 \times 5^3 \times 11$

$$240k = 2^4 \times 3 \times 5^3 \times 11$$

$$k = \frac{2^4 \times 3 \times 5^3 \times 11}{2^4 \times 3 \times 5} = 5^2 \times 11 = 275 \quad \boxed{A1}$$

7. $p = 2/q = 7$

8. (a) 27 (b) $\sqrt[3]{2^3 \times 7^3} = 2 \times 7 = 14$

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2024 BUKIT VIEW SECONDARY SCHOOL S1 EOY P1 Q7 [2 Marks]

1

It is given that $2646 = 2 \times 3^3 \times 7^2$.

(a) Express 180 as the product of its prime factors.

$$\begin{array}{r|l}
 2 & 180 \\
 \hline
 2 & 90 \\
 \hline
 3 & 45 \\
 \hline
 3 & 15 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

Answer..... $2^2 \times 3^2 \times 5$ [1]

(b) It is given that $2646k$ is a perfect square, where k is a positive integer. Find the smallest possible value of k .

$$2646k = \underbrace{2 \times 3^3 \times 7^2}_{2646} \times \underbrace{2 \times 3}_k = 2^2 \times 3^4 \times 7^2$$

$$k = 2 \times 3 = 6$$

Goal is to make the power of all prime factors an even number.

Answer..... 6 [1]

2022 QUEENSWAY SECONDARY SCHOOL S1 EOY P1 Q1 [2 Marks]

2

(a) Explain why 324 is a perfect square.

$$\begin{array}{r|l}
 2 & 324 \\
 \hline
 2 & 162 \\
 \hline
 3 & 81 \\
 \hline
 3 & 27 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

$$\therefore 324 = 2^2 \times 3^4$$

Since $324 = 2^2 \times 3^4$, the power of all its prime factors are even number/multiples of 2, 324 is a perfect square.

Answer..... [1]

(b) Find the smallest value of k given that $\frac{324}{k}$ is a perfect cube.

$$\frac{324}{k} = \frac{2^2 \times 3^4}{k}$$

$$= \frac{\cancel{2^2} \times 3^4}{\underbrace{2^2 \times 3}_k} = 3^3$$

Goal is to make the power of all prime factors multiple of 3.

Answer $k = 12$ [1]

$$k = 12$$

3 Find the smallest whole number that is divisible by both 720 and 744, leaving your answer as a product of prime factors.

LCM

2	720	744
2	360	372
2	180	186
	90	93

↑
Not a prime number

$$720 = 2^4 \times 3^2 \times 5$$

$$744 = 2^3 \times 3 \times 31$$

$$Lcm = 2^4 \times 3^2 \times 5 \times 31$$

$$Lcm = 2^4 \times 3^2 \times 5 \times 31$$

Answer [1]

4 There are three sirens, A, B and C on Happy Island. Siren A will sound off every 12 minutes, Siren B will sound off every 30 minutes and Siren C will sound off every 40 minutes. If they started sounding off at 8 am, what time will the three sirens sound off together at the same time again?

2	12	30	40
2	6	15	20
3	3	5	10
5	1	1	2
	1	1	2

$$Lcm = 2^3 \times 3 \times 5 = 120$$

8 am → 9 am — 10 am

Answer 10 am [2]

2024 CRESCENT GIRLS S4 PRELIM P1 Q2 [2 Marks]

5

The following items are to be packed into gift bags for distribution to an old folks' home.

84 packets of cereals. 126 cans of baked beans. 168 packets of biscuits.

The items are to be packed such that the contents in each gift bag are the same and there are no leftovers. Find

(a) the maximum number of gift bags required,

$$\begin{array}{r|rrr}
 2 & 84 & 126 & 168 \\
 \hline
 3 & 42 & 63 & 84 \\
 \hline
 7 & 14 & 21 & 28 \\
 \hline
 & 2 & 3 & 4
 \end{array}$$

$$\text{HCF} = 2 \times 3 \times 7 = 42$$

Answer 42 [2]

2025 METHODIST GIRLS' S4 PRELIM P1 Q6 [3 Marks]

6

Written as a product of its prime factors, $240 = 2^4 \times 3 \times 5$ and $2750 = 2 \times 5^3 \times 11$.

(i) Find the smallest positive integer n for which $\sqrt{2750n}$ is a whole number.

$$\begin{aligned}
 \sqrt{2750n} &= \sqrt{2 \times 5^3 \times 11 \times n} \\
 &= \sqrt{2 \times 5^3 \times 11 \times \underbrace{2 \times 5 \times 11}_n} \\
 &= \sqrt{2^2 \times 5^4 \times 11^2}
 \end{aligned}$$

$$\therefore n = 2 \times 5 \times 11 = 110$$

Answer 110 [2]

