Important Instruction :
:

• There are total 20 multiple choice questions carrying 1 mark each.

• Each MCQs has 4 choices out of which only one choice is the correct answer.

• All questions are mandatory

• Each correct answer is awarded 1 mark.

• The maximum time allowed for the test is 30 minutes.

Mathematics

1. In a seminar, the number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively. Find the maximum number of rooms required if in each room the same number of participants are to be seated and all of them being in the same subject. **1 Mark[s]** **(688175)**

a. 17
b. 21
c. 27
d. 19

Right Answer:
b. 21
Solution: 21, number of participants in each room must be the HCF of 60, 84 and 108.
The prime factorization of 60, 84 and 108 are:
$60 = 2^2 \times 3 \times 5$, $84 = 2^2 \times 3 \times 7$ and $108 = 2^2 \times 3^3$
HCF of 60, 84 and 108 is $2^2 \times 3 = 12$
Therefore, in each room 12 participants can be seated.
Number of rooms required = Total number of participants /12
= 60 + 84 + 108 /12 = 252 / 12 = 21

2. The HCF of two numbers is 16 and their LCM is 160. If one of the number is 80, then the other number is: **1 Mark[s]** **(1659945)**

a. 20

b. 28

c. 32

d. 36

Right Answer:
c. 32

Solution:
Let the other number be n.

And we know that, Product of the numbers = HCF of the numbers × LCM of the numbers

Therefore, 80 × n = 16 × 160

or, n = 32

3. LCM of two numbers = **1 Mark[s]** **(1659941)**

a. Product of numbers ÷ HCF of two numbers

b. Product of numbers × HCF of two numbers

c. Product of numbers

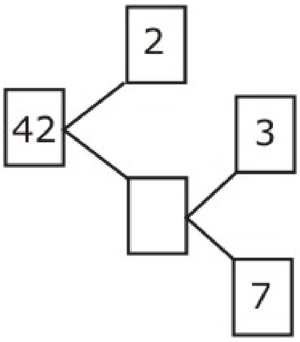
d. None of these

Right Answer:
a. Product of numbers ÷ HCF of two numbers

Solution:
Product of numbers = LCM × HCF

LCM = Product of numbers ÷ HCF

4. The missing number in the given factor tree is **1 Mark[s]** **(1640308)**



a. 11

b. 12

c. 13

d. 21

Right Answer:
d. 21

Solution:
42 = 2 x 21

5. Any odd positive integer will be of the form **1 Mark[s]** **(1640310)**

a. 4q + 1 or 4q + 3

b. 4q or 4q + 2

c. 3q + 1 or 3q + 3

d. 3q or 3q +2

Right Answer:
a. 4q + 1 or 4q + 3

Solution:

Let a be any odd positive integer and b $= 4$.
By division Lemma there exists integers q and r such that $a = 4q + r$, where $0 \leq r < 4$

$$\Rightarrow a = 4q \text{ or, } a = 4q + 1 \text{ or, } a = 4q + 2 \text{ or, } a = 4q + 3$$

$$\begin{bmatrix} \because 0 \leq r < 4 \\ \Rightarrow r = 0, 1, 2, 3 \end{bmatrix}$$

$$\Rightarrow a = 4q + 1 \text{ or, } a = 4q + 3 \begin{bmatrix} \because a \text{ is an odd integer} \\ \therefore a \neq 4q, a \neq 4q + 2 \end{bmatrix}$$

Hence, any odd integer is of the form $4q + 1$ or, $4q + 3$.

6. Which of the following does not have terminating decimal expansion? **1 Mark[s]** **(1599800)**

a. $\frac{77}{140}$

b. $\frac{11}{80}$

c. $\frac{104}{3000}$

d. $\frac{45}{10000}$

Right Answer:
c. $\frac{104}{3000}$

Solution:

a) $\frac{77}{140} = \frac{11}{20} = \frac{11}{2^2 \times 5}$

b) $\frac{11}{80} = \frac{11}{2^4 \times 5}$

c) $\frac{104}{3000} = \frac{13}{375} = \frac{13}{3 \times 5^3}$

d) $\frac{45}{10000} = \frac{9}{2000} = \frac{9}{2^4 \times 5^3}$

So, $\frac{104}{3000}$ does not have terminating decimal expansion because the prime factorisation of 3000 is not of the form $2^n \times 5^m$.

7. What is the decimal representation of $\frac{161}{256}$? **1 Mark[s]** **(1640346)**

a. a terminating decimal

b. a non-terminating decimal

c. an irrational number

d. a perfect square number

Right Answer:
a. a terminating decimal

Solution:
Since 256 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 ,

2 is the only prime factor of 256.

Therefore, 161/256 is a terminating decimal.

8. An irrational number between 2/7 and 3/7 is **1 Mark[s]** **(1640356)**

a. 0.245316245316...

b. 0.0317360

c. 0.3043004300004...

d. 0.438105438105...

Right Answer:
c. 0.3043004300004...

Solution:
We have

2/7 = 0.285714285714...

3/7 = 0.428571428571...

Therefore, the required irrational number between 2/7 and 3/7 is0.3043004300004...

9. The decimal expansion of the rational number $\frac{32578}{1250}$ will terminate after: **1 Mark[s]** **(1665401)**

a. one decimal places

b. two decimal places

c. three decimal places

d. four decimal places

Right Answer:
d. four decimal places

Solution:
$$\frac{32578}{1250} = \frac{32578}{2^1 \times 5^4}$$
We know,
If the denominator of a rational number is of the form $2^n 5^m$,
then it will terminate after n places if $n > m$ or m places if $m > n$.
Here, $m = 4 > 1 = n$
So, the given rational number will terminate after 4 decimal places.

10. The LCM of two numbers is 45 times their HCF If one of the numbers is 125 and the sum of HCF and LCM is 1150, the other number is **1 Mark[s]** **(688173)**
a. 215.
b. 220.
c. 225.
d. 235.

Right Answer:
c. 225.
Solution: Let HCF be h and LCM be l. Then, $l = 45h$ and $l + h = 1150$.
$45h + h = 1150$ or $h = 25$. So, $l = (1150 - 25) = 1125$

$$\text{Hence, other number} = \frac{25 \times 1125}{125} = 225$$

11. **Three bells chime at an interval of 18, 24 and 32 minutes respectively. At a certain time they begin to chime together. What length of time will elapse** **1 Mark[s]** **(688184)**

before they chime together again?

a. 2 hours 24 minutes
b. 4 hours 48 minutes
c. 1 hour 36 minutes
d. 5 hours

Right Answer:
b. 4 hours 48 minutes
Solution:
L.C.M of 18, 24 & 32 = 288

Hence they would chime after every 288 min. or 4 hrs 48 min.

12. **Find the greatest possible rate at which a man should walk to cover a distance of 70 km and 245 km in exact number of days?** **1 Mark[s] (688185)**

a. 55
b. 60
c. 35
d. 45

Right Answer:
c. 35
Solution: By Euclid's theorem, we get the following equations
$245 = 70 \times 3 + 35$

$70 = 35 \times 2 + 0$

So our procedure stops. Since the divisor at this stage is 35

HCF (70, 245) = 35

Rate = HCF of 70 and 245 = 35

13. **If n is an odd positive integer greater than 1, then $n^2 – 1$ will always be divisible by** **1 Mark[s] (688176)**

a. 3.
b. 5.
c. 8.
d. 16.

Right Answer:
c. 8.
Solution:
We know that any odd positive integer is of the form 4q + 1 or, 4q + 3.

Therefore, when n = 4q + 1, we have

$n^2 – 1 = (4q + 1)^2 – 1 = 16q^2 + 8q + 1 – 1 = 8q(2q + 1)$

$\Rightarrow$ $n^2 – 1$ is divisible by 8.

When n = 4q + 3, we have

$n^2 – 1 = (4q + 3)^2 – 1 = 16q^2 + 24q + 9 – 1 = 8(2q + 1)(2q + 1)$

$\Rightarrow$ $n^2 – 1$ is divisible by 8.

Hence, $n^2 – 1$ is divisible by 8.

14. **The length, breadth and height of a room are 8 m 25cm, 6m 75cm and 7m 50cm respectively. Determine the longest tape, which can measure the three dimensions of the room exactly.** **1 Mark[s] (688183)**

a. 75 cm
b. 150 cm

c. 90 cm
d. 180 cm

Right Answer:
a. 75 cm
Solution: Length of a room = 8 m 25 cm = 825 cm
Breadth of a room = 6 m 75 cm = 675 cm

Height of a room = 4 m 50 cm = 450 cm

The longest tape, which can measure the three dimensions of

the room, is the HCF of 825 cm, 675 cm and 450 cm.

We first find the HCF of 825 cm and 675 cm

$825 = 675 \times 1 + 150$

$675 = 150 \times 4 + 75$

$150 = 75 \times 2 + 0$

The remainder has now become zero, so our procedure stops.

Since the divisor at this stage is 75.

HCF (825, 675) = 75

Now we find the HCF of 75 and 450.

Using Euclid's algorithm, we have the following equation

$450 = 75 \times 6 + 0$

The remainder has now become zero, so our procedure

stopsSince the divisor at this stage is 75.

HCF (75, 450) = 75

So, HCF of 825, 675 and 450 is 75

Hence the required length of the tape is 75 cm.

15. **A man was engaged for a certain number of days for Rs. 404.30 but because of being absent for some days he was paid only Rs. 279.90. His daily wages cannot exceed by:** **1 Mark[s]** **(688187)**
a. Rs. 29.10.
b. Rs. 31.30.
c. Rs. 31.10.
d. Rs. 31.41.

Right Answer:
c. Rs. 31.10.
Solution:
By Euclid's theorem, we get the following equations

$404.30 = 279.90 \times 1 + 124.40$

$279.90 = 124.40 \times 2 + 31.10$

$124.40 = 31.10 \times 4 + 0$

So our procedure stops. Since divisor at this stage is 31.10

HCF (404.30, 279.90) = 31.1

His maximum daily wages must be the H.C.F. of 404.30 and 279.90, which is 31.10.

16. Let the sum of two numbers be 55 such that the HCF and LCM of these numbers are 5 and 120 respectively. What is the sum of the reciprocals of the numbers? **1 Mark[s]** **(1640243)**

a. $\frac{601}{55}$

b. $\frac{120}{11}$

c. $\frac{11}{120}$

d. $\frac{55}{601}$

Right Answer:
c. $\frac{11}{120}$

Solution:
Let the two numbers be *a* and *b*.
Then, $a + b = 55$
and ab = HCF × LCM
= 5 ×120
= 600

$$\text{Required sum} = \frac{1}{a} + \frac{1}{b} = \frac{a+b}{ab} = \frac{55}{600} = \frac{11}{120}$$

17. There is a circular path around a sports field. Priya takes 18 minutes to drive one round of the field, while Ravish takes 12 minutes for the same. Suppose they both start at the same point and at the same time and go in the same direction. After how many minutes will they meet again at the starting point? **1 Mark[s]** **(1640283)**

a. 30

b. 36

c. 40

d. 26

Right Answer:
b. 36

Solution:
Required time in minutes = LCM of 18 and 12

The prime factorisation of 18 and 12 is given below:

$18 = 2 \times 3^2$ and $12 = 2^2 \times 3$

LCM of 18 and 12 = $2^2 \times 3^2 = 36$
Hence, Ravish and Priya will meet again at the starting point after 36 minutes.

18. If the HCF of 657 and 963 is expressible in the form 657n + 963 x (–15), then what is the value of n? **1 Mark[s]** **(1640288)**

a. 21

b. 22

c. 23

d. 24

Right Answer:
b. 22

Solution:
Use Euclid’s division lemma to find the HCF of 657 and 963.

This gives the relation,

963 = 657 x 1 + 306

657 = 306 x 2 + 45

306 = 45 x 6 + 36

45 = 36 x 1 + 9

36 = 9 x 4

⇒ H.C.F. of 657 and 963 = 9

The given expression for the HCF of two numbers is 657n + 963 x (–15).

This implies that,

⇒ 657n + 963 x (–15) = 9

⇒ 657n = 9 + 14445

⇒ 657n = 14454

⇒ n = 22

19. The greatest 6 digit number exactly divisible by 24, 15 and 36 is: **1 Mark[s]** **(1640269)**

a. 999999

b. 999789

c. 999000

d. 999720

Right Answer:
d. 999720

Solution:
Greatest 6 digit number is 999999.

The required number must be divisible by the LCM of 24, 15, 36.
LCM of 24, 15, 36 = 2^3 x 3^2 x 5 = 360

Hence, the required number is given by,

999999 – Remainder when 999999 is divided by 360
= 999999 – 279
= 999720

20. In a school, there are two sections, section A and section B of class X. There are 32 students in section A and 36 students in section B. The minimum number of books required for their class library so that they can be distributed equally among students of section A or section B is **1 Mark[s]** **(1640286)**

a. 300

b. 296

c. 288

d. 278

Right Answer:

c. 288

Solution:

Note that the books are to be distributed equally among the students of section A and section B.

Hence, required number of books is the LCM of 32 and 36.

We have, $32 = 2^5$ and $36 = 2^2 \times 3^2$

LCM of 32 and 36 is $2^5 \times 3^2 = 288$

Hence, the required number of books is 288.