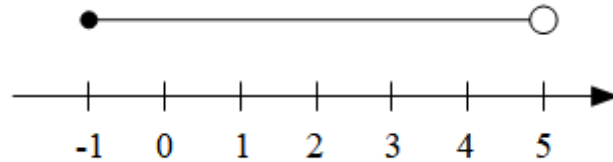


RIVER VALLEY HIGH SCHOOL

MATH Test 1 2023 Solutions

1.



2. The temperature difference is:

$$\begin{aligned} & 38^{\circ}\text{C} - (-3.5^{\circ}\text{C}) \\ &= 38^{\circ}\text{C} + 3.5^{\circ}\text{C} \\ &= 41.5^{\circ}\text{C} \end{aligned}$$

3.

Because $\sqrt[3]{392 \times 1694 \times m}$ is a integer,
 $392 \times 1694 \times m$ must be a cube number.

$$\begin{aligned} & \sqrt[3]{392 \times 1694 \times m} \\ &= \sqrt[3]{2^3 \times 7^2 \times 2 \times 7 \times 11^2 \times m} \\ &= \sqrt[3]{2^4 \times 7^3 \times 11^2 \times m} \\ &= \sqrt[3]{2^4 \times 7^3 \times 11^2 \times 2^2 \times 11} \\ &= \sqrt[3]{2^6 \times 7^3 \times 11^3} \\ &= 2^2 \times 7 \times 11 \\ &= 308 \end{aligned}$$

$$\text{Thus, } m = 2^2 \times 11 = 44$$

Thus, the smallest whole number m is 44.

4. (i) Since the length of the block's each side can be divisible by the length of cube's side,

The length of cube's side is the **common factor** of the length of the block's each side. And the length is the largest, so we need to find the **HCF** of 180, 72, and 252. We can use Ladder Method:

$$2 \overline{)180 \ 72 \ 252}$$

$$2 \overline{)90 \ 36 \ 126}$$

$$3 \overline{)45 \ 18 \ 63}$$

$$3 \overline{)15 \ 6 \ 21}$$

$$5 \ 2 \ 7$$

$$HCF = 2 \times 2 \times 3 \times 3 = 36$$

Thus, the largest possible length of each cube is 36 cm.

(ii) Since the number of cubes is the minimized, the length of the cube should be the largest.

We have known that the largest length of cube is 36 cm.

Then the minimum number of cubes is:

$$(180 \div 36) \times (72 \div 36) \times (252 \div 36)$$

$$= 5 \times 2 \times 7$$

$$= 70$$

Thus, the minimum number of cubes is 70.

5. (a) False.

Because we can use Ladder Method to find the factor of $2 \times p$:

$$2 \overline{)2 \times p}$$

$$p \overline{)p}$$

$$1$$

We can find that $2 \times p$, except from 1 and itself, at least has the factor 2 and factor p .

According to the definition, $2 \times p$ must be composite number.

(b) True.

Because n is a positive even integer, which means $(-3)^n$ is the product of n “(-3)”.

That means there is totally n “-”, n is positive even integer.

We know even number of “-” will become “+”.

Thus, the sign of the result of $(-3)^n$ must be positive.

Since $k = -1 \times 2 \times (-3)^n$, and the sign of $(-3)^n$ is positive, the sign of k must be negative.

Since $k = -1 \times 2 \times (-3)^n = [-1 \times (-3)^n] \times 2$, 2 is a factor of k . Thus, k must be an even number.

Thus, k must be a negative even number.

6. (a) 1, 6

(b) $1, \frac{2}{3}, 6$

(c) 0, 6

(d) 6

7. (a)

$$196 = 2^2 \times 7^2$$

$$\sqrt{196}$$

$$= \sqrt{2^2 \times 7^2}$$

$$= 2 \times 7$$

$$= 14$$

(b)

$$54 = 2 \times 3^3$$

$$168 = 2^3 \times 3 \times 7$$

$$HCF = 2 \times 3 = 6$$

(c)

$$6 = 2 \times 3$$

$$15 = 3 \times 5$$

$$4 \times k = 2^2 \times k$$

$$k = 3^2 \times 11 = 99$$

The smallest value of k is 99.

8. (a)

$$\sqrt[3]{27} - 2^2$$

$$= 3 - 4$$

$$= -1$$

(b)

$$\begin{aligned}\frac{-6}{2} - 7 - 6 \\ = -3 - 7 - 6 \\ = -16\end{aligned}$$

(c)

$$\begin{aligned}5 - 3(-8 + 2) \\ = 5 - 3 \times (-6) \\ = 5 - (-18) \\ = 5 + 18 \\ = 23\end{aligned}$$

(d)

$$\begin{aligned}(14 - 4 \times 2) \times 2 + 6 + 12 \div 3 \\ = (14 - 8) \times 2 + 6 + 4 \\ = 6 \times 2 + 10 \\ = 12 + 10 \\ = 22\end{aligned}$$

9. A twin prime is a prime number that is either 2 less or 2 more than another prime number—for example, either member of the twin prime pair (17, 19) or (41, 43).

Sum of five terms = 707

Average of these five terms is:

$$707 \div 5 = 141.4$$

So the prime numbers can be traced somewhere near 139.

By starting with 23, the consecutive prime numbers around it are:

131, 137, 139, 149, 151, 157

The sum of $131+137+139+149+151=707$.

We can find:

$$139-137=2$$

$$151-149=2$$

Thus, the five consecutive prime numbers are:

131, 137, 139, 149, 151