

1 . Answer: A

Explanation: To determine how many $\frac{3}{4}$ s are there in $\frac{15}{9}$, we divide $\frac{15}{9}$ by $\frac{3}{4}$:

$$\frac{15}{9} \div \frac{3}{4}$$

To divide fractions:

Step 1: Change the operation to multiplication

$$\frac{15}{9} \times \frac{3}{4}$$

Step 2: Get the reciprocal of the divisor (interchange the values of the numerator and the denominator of the divisor)

$$\frac{15}{9} \times \frac{4}{3}$$

Step 3: Perform multiplication.

Note: When multiplying fractions, you may perform cancellation if some of the numbers have common factors. Cancellation makes the computation easier. In this case, we cancel out 15 and 3 since these numbers have a common factor of 3.

$$\begin{array}{r} 5 \\ \frac{15}{9} \times \frac{4}{3} \\ \hline \frac{5}{9} \times \frac{4}{1} = \frac{20}{9} \end{array}$$

Thus, the quotient is equal to $\frac{20}{9}$.

2. Answer: C

Explanation: Since 30% of the employees of the company prefers Machine A to Machine B, then 70% (100% - 30% = 70%) of the employees of the company prefers Machine B to Machine A. If there are 500 employees, then:

$$70\% \times 500 = 0.70 \times 500 = 350$$

350 employees prefer Machine B to Machine A.

3. Answer: B

Explanation: Following the order of operations (PEMDAS). We start simplifying the terms inside the parenthesis. In particular, the values with exponents:

$$5^2 + (3^3 + (-3)) \div (-2^3)$$

$$5^2 + (27 + (-3)) \div (-8)$$

$$25 + (24) \div (-8)$$

Now, we are left with addition and division in the expression. Since division comes first before addition based on the order of operations (D comes first before A in PEMDAS).

We perform division:

$$25 + (24) \div (-8)$$

$$25 + (-3)$$

Lastly, we perform addition:

$$25 + (-3) = 22$$

4. Answer: D

Explanation: 5 402 819 has the digits 5 and 2 as the underlined digits. The place value of 5 is millions place while the place value of 2 is thousands place

Therefore, the values of the underlined digits 5 and 2 in 5 402 819 are 5 000 000 and 2 000 respectively.

To determine the difference between their values: 5 000 000 - 2 000 = 4 998 000

5. Answer: D

Explanation: A number is divisible by 4 if the number formed by the last two digits of the number is divisible by 4.

The last two digits of 7589A6 is A6. Thus, A6 must be a number which is divisible (or a multiple) of 4.

From the given options:

(A) If A = 9, then A6 = 96 and 96 is divisible by 4.

(B) If A = 5, then A6 = 56 and 56 is divisible by 4.

(C) If A = 3, then A6 = 36 and 36 is divisible by 4.

(D) If $A = 2$, then $A6 = 26$ and 26 is not divisible by 4

6. Answer: D

Explanation: Simplifying each expression in the given options:

$$(A) (a - b)(a - b) = a^2 - 2ab + b^2 = a^2 + b^2 - 2ab$$

$$(B) a(a - 2b) + b^2 = a^2 - 2ab + b^2 = a^2 + b^2 - 2ab$$

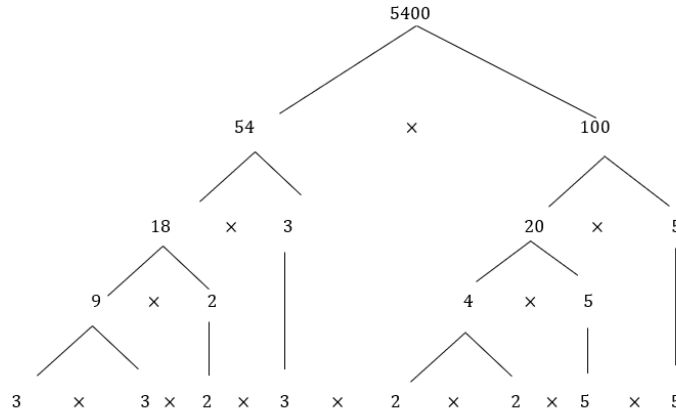
$$(C) (a + b)^2 - 4ab = a^2 + 2ab + b^2 - 4ab = a^2 + b^2 - 2ab$$

$$(D) (a + b)(a - b) - 2ab = a^2 - b^2 - 2ab \neq a^2 + b^2 - 2ab$$

The expression in option D is not equal to $a^2 + b^2 - 2ab$.

7. Answer: C

Explanation: Note that from the given expressions in the choices, the question requires us to find the correct prime factorization of 5400.



Shown above is the prime factorization of 5400 using a tree diagram.

The numbers at the lowermost part of the tree diagram are the prime factors of 5400. We have:

$$3 \times 3 \times 2 \times 3 \times 2 \times 2 \times 5 \times 5 = 5400$$

We can group together the factors as follows:

$$(2 \times 2 \times 2) \times (3 \times 3 \times 3) \times (5 \times 5) = 5400$$

Expressing in exponential form:

$$2^3 \times 3^3 \times 5^2 = 5400$$

8. Answer: C

Explanation: Let m be the smaller number and $5m$ be the larger number. The sum of these numbers is 180.

Thus,

$$m + 5m = 180$$

Solving for the value of m :

$$m + 5m = 180$$

$$6m = 180$$

$$m = 30$$

To find the larger number: $5m = 5(30) = 150$

9. Answer: A

Explanation:

$$\frac{x+3}{2} + \frac{2x-1}{3} = 5$$

Multiply both sides of the equation by the Least Common Denominator which is 6

$$6\left(\frac{x+3}{2} + \frac{2x-1}{3}\right) = 6(5)$$

$$3(x+3) + 2(2x-1) = 30$$

Solving for the value of x :

$$3(x+3) + 2(2x-1) = 30$$

$$3x + 9 + 4x - 2 = 30$$

$$7x + 7 = 30$$

$$7x = 23$$

$$x = \frac{23}{7}$$

10. Answer: A

Explanation:

To find the median of the set of values: 29, 43, 13, 2, 52, 19, 10, 38

Step 1: Arrange the values in increasing order:

2, 10, 13, 19, 29, 38, 43, 52

Step 2: Determine the middle value(s):

In this set: 2, 10, 13, 19, 29, 38, 43, 52, there are 8 values.

If the given set of values has an even number of members, we are expecting that there are two middle values. Otherwise, the set of values has only one middle value.

Thus, we are expecting that there are 2 middle values in the given set of values:

2, 10, 13, **19, 29**, 38, 43, 52

Step 3: Obtain the mean or average of the middle values:

$$\frac{19 + 29}{2} = \frac{48}{2} = 24$$

Thus, the median is 24.

11. Answer: B

Explanation: To determine how many square meters Harry's room occupies, we need to determine the area of the room.

$$A = l \times w$$

$$A = 2.5 \times 3.5$$

$$A = 8.75 \text{ m}^2$$

Thus, Harry's room has an area of 8.75 square meters.

The cost for floor tiles is given as Php 420.00 per square meters:

$$8.75 \times 420 = \text{Php } 3675.00$$



Numerical Ability Answer key

Set 2: Basic Operations

Thus, Harry needs to pay Php 3675.00 for his room's floor tiles.

12. Answer: B

Explanation: By the distributive property, we can express $5 + 10 + 15 + 20 + \dots + 495 + 500$ as $5(1 + 2 + 3 + 4 + \dots + 100)$.

Now that we have $5(1 + 2 + 3 + 4 + \dots + 100)$, we can now focus with the addends inside the grouping symbol which implies the sum of the whole numbers from 1 to 100.

In this case, it is helpful to remember that the sum of whole numbers from 1 to 100 is equal to 5050. However, in case you are not familiar with the sum of these numbers, you can perform this technique:

Notice that:

$$1 + 100 = 101$$

$$2 + 99 = 101$$

$$3 + 98 = 101$$

$$4 + 97 = 101$$

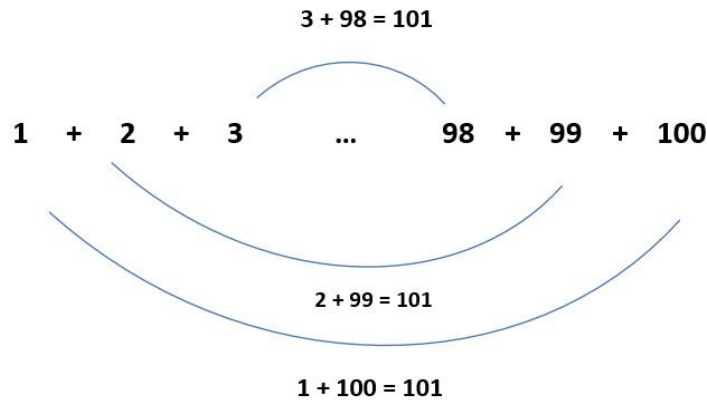
$$5 + 96 = 101$$

And so on.



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To God be the glory!



If you pair the addends in this manner, you will always obtain 101 as the sum. Since, there will be 50 pairs that will be formed in $1 + 2 + 3 + 4 + \dots + 100$. Then, we can express the sum of $1 + 2 + 3 + 4 + \dots + 100$ as $101(50) = 5050$. Lastly, we have $5(1 + 2 + 3 + 4 + \dots + 100) = 5(5050) = 25250$.

13. Answer: A

Explanation: $\frac{1}{3} \left(\frac{4}{5} + \frac{2}{3} \right) \div \frac{1}{2} \left(\frac{3}{2} + \frac{1}{3} \right)$

Following the order of the operations (PEMDAS), we start by simplifying the terms inside the parenthesis.

$$\frac{1}{3} \left(\frac{4}{5} + \frac{2}{3} \right) \div \frac{1}{2} \left(\frac{3}{2} + \frac{1}{3} \right)$$

$$\frac{1}{3} \left(\frac{12}{15} + \frac{10}{15} \right) \div \frac{1}{2} \left(\frac{9}{6} + \frac{2}{6} \right)$$

$$\frac{1}{3} \left(\frac{22}{15} \right) \div \frac{1}{2} \left(\frac{11}{6} \right)$$

Since there are no exponents involved, we proceed to multiplication:

$$\frac{22}{45} \div \frac{11}{12}$$

Lastly, we perform division. Recall that to perform division of fractions, we reciprocate the divisor then proceed to multiplication.

$$\frac{22}{45} \times \frac{12}{11}$$

Note that we can perform cancellation:

$$\begin{array}{c} 2 \qquad \qquad 4 \\ \cancel{\frac{22}{45}} \times \cancel{\frac{12}{11}} = \frac{8}{15} \\ 15 \qquad \qquad 1 \end{array}$$

14. Answer: C

Explanation: Recall that the average of a set of numbers is obtained by dividing the sum of the set of numbers by the total number of addends in that set:

$$average = \frac{sum\ of\ numbers}{total\ number\ of\ addends}$$

It was stated in the problem that 25 students obtained an average score of 89:

$$89 = \frac{sum\ of\ scores}{25}$$

Then, the sum of the scores of 25 students is equal to:

$$sum\ of\ scores = 89(25) = 2225$$

Meanwhile, 20 students obtained an average score of 87:

$$87 = \frac{\text{sum of scores}}{20}$$
$$\text{sum of scores} = 87(20) = 1740$$

We can now obtain the total scores obtained by 45 students: $2225 + 1740 = 3965$

Now, to compute for the average score of 45 students:

$$\text{average} = \frac{3965}{45} = 88.11$$

15. Answer: D

Explanation: We can simplify the expression before substituting the value of m :

$$\frac{2m^2 + 7m + 6}{m^2 - 4}$$
$$\frac{(2m + 3)(m + 2)}{(m + 2)(m - 2)}$$

Since $m + 2$ is a common factor of the numerator and the denominator:

$$\frac{2m + 3}{m - 2}$$

Substituting $m = -1$

$$\frac{2(-1) + 3}{(-1) - 2}$$

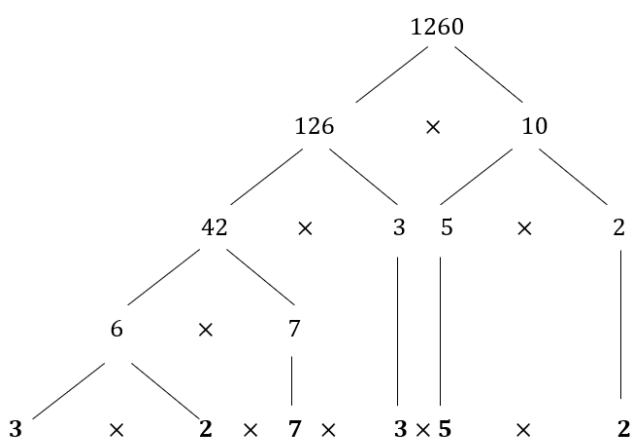
$$\frac{(-2) + 3}{(-3)}$$

$$\frac{1}{-3} = -\frac{1}{3}$$

16. Answer: B

Explanation: Since a , b , c , and d are factors of 1260 and they are all prime numbers. Then, $a^p \times b^q \times c^r \times d^s$ refers to the prime factorization of 1260 expressed in exponential form.

Shown below is the prime factorization of 1260 using a tree diagram:



The numbers at the bottom of the tree diagram are the prime factors of 1260 which are:

$$3 \times 2 \times 7 \times 3 \times 5 \times 2 = 1260$$

We can group the factors in this way:

$$(2 \times 2) \times (3 \times 3) \times 5 \times 7 = 1260$$

Expressing in exponential form:

$$2^2 \times 3^2 \times 5 \times 7 = 1260$$

Note that we already expressed 1260 in the form $a^p \times b^q \times c^r \times d^s$ such that a , b , c , and d are prime numbers. Then, $p = 2$, $q = 2$, $r = 1$, and $s = 1$. Thus,

$$p + q + r + s = 2 + 2 + 1 + 1 = 6$$

17. Answer: A

Explanation:

The given mathematical expression in this item is a proportion in which one of its terms is missing

We can use either of these two methods when solving proportion with one of its terms is missing:

Method 1: By observation

Take a look at the first terms of the proportion

$$4 : 5 = 36 : m$$

What number must be multiplied to 4 to obtain 36? The number must be 9.

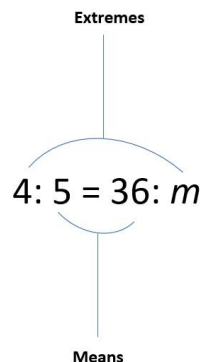
Hence, we must also multiply 5 by 9 to obtain m :

$$\text{Thus, } 5 \times 9 = 45$$

$$m = 45.$$

Method 2: Means-Extremes Property of Proportion.

Extremes are the “outer” member of the proportion while Means are the “inner” member of the proportion.



In a proportion, the product of the extremes is equal to the product of the means:

$$4 \times m = 5 \times 36$$

$$4m = 180$$

$$m = 45$$

18. Answer: A

Explanation: We can express $x = 6 - y$ and $x = \frac{2}{y}$ as $x + y = 56$ and $xy = 2$ respectively.

Thus, we have these equations:

$$\text{(Eq. 1) } x + y = 6 \text{ and}$$

$$\text{(Eq. 2) } xy = 2$$

To find the value of $(x - y)^2$, we need to express $(x - y)^2$ in terms of $x + y$ and xy so that we can use the (Eq.1) and (Eq.2) above.

Expanding $(x - y)^2$ will result to $x^2 - 2xy + y^2$ which we can rewrite as $x^2 + y^2 - 2xy$.

Note that $x^2 + y^2$ is equal to $(x + y)^2 - 2xy$

Thus, $x^2 + y^2 - 2xy = (x + y)^2 - 2xy - 2xy = (x + y)^2 - 4xy$

Hence, $(x - y)^2 = (x + y)^2 - 4xy$

Now, we already expressed $(x - y)^2$ in terms of $x + y$ and xy , we can now use (Eq.1) and (Eq.2)

$$(x - y)^2 = (x + y)^2 - 4xy$$

$$(x - y)^2 = (6)^2 - 4(2)$$

$$(x - y)^2 = 28$$

19. Answer: C

Explanation: The company's revenue increases by 10% each month:

January: Php 30 000

To find the company's revenue for the month of February, we just add the 10% of 30 000 to January' revenue:

February: $30\,000 + 30\,000(0.10) = 30\,000 + 3\,000 = 33\,000$

We will just perform the same method for the month of March:

March: $33\,000 + 33\,000(0.10) = 33\,000 + 3\,300 = 36\,300$

20. Answer: A

Explanation : Let x be the smallest odd integer. Since the odd integers are consecutive. Then, the succeeding integers are:

$x + 2$, $x + 4$, $x + 6$, and $x + 8$ (we just add 2 to the previous integer since the integers are odd).

The sum of these five consecutive odd integers is equal to -56 plus the largest of the odd integers. Note that $x + 8$ is the largest of the five integers we have defined above.

Then, we can form this equation:

$$x + (x + 2) + (x + 4) + (x + 6) + (x + 8) = -56 + (x + 8)$$

Simplifying:

$$5x + 20 = -48 + x$$

$$4x = -68$$

$$x = -17$$

The smallest odd integer in our problem is -17.