1) Answer: D

Explanation: A number is divisible by 3 if and only if the sum of its digits is also divisible by or a multiple of 3. Let us try each option whether they will qualify this criterion:

(a) If X = 2, then we have 28, 542 whose sum of digits is 2 + 8 + 5 + 4 + 2 = 21. 21 is divisible by 3 since 21 divided by 3 is 7. So, X = 2 is a possible answer.

(b) If X = 4, then we have 28, 544 whose sum of digits is 2 + 8 + 5 + 4 + 4 = 24. 24 is not divisible by 3. So, X = 4 is not a possible answer.

(c) If X = 5, then we have 28, 544 whose sum of digits is 2 + 8 + 5 + 4 + 5 = 23. 24 is divisible by 3 since 24 divided by 3 is 8. So, X = 5 is a possible answer.

Since option (d) refers to both A and C being the correct answers, then the answer to this problem is D.

2) Answer: A

Explanation: The formula for the area of a square is given by $A = s^2$, where *s* is the length of the side of the square. If the length of the given square in the problem is expressed as 2 - 4x, then we have:

$A = s^2$
$A = (2 - 4x)^2$ *since s = 2 - 4x*
$A = 4 - 16x + 16x^2$ *square of binomial*

Thus, the area of the square in this problem is *4 - 16x + 16x^2 square units.*

3) Answer: D

Explanation: Let *x* be the number. According to the given problem, if this number is divided by 5 and then increased by 5, the result is 14. So, if we write this as an equation, we have:

$$(x \div 5) + 5 = 14$$

We can rewrite $x \div 5$ as a fraction:

$$\frac{x}{5} + 5 = 14$$

Let us now solve for the value of *x* using the equation above:

$$\frac{x}{5} + 5 = 14$$

$$\frac{x}{5} = -5 + 14 \qquad \textit{Transposition method}$$

$$\frac{x}{5} = 9$$

$$5\left(\frac{x}{5}\right) = 5(9) \qquad \textit{Multiply both sides by 5 to remove the denominator}$$

x = 45

Since *x* represents the unknown number, then 45 is the unknown number of this problem.

Therefore, the answer is 45.

4) Answer: A

Explanation: Suppose that *s* is the length of the side of the square. 10% of *s* is simply 0.10s. Therefore, if the length of the square is increased by 10%, then the new length will be *s + 0.10s = 1.10s.*

Recall that the perimeter of the square is just the sum of the length of its sides.

The perimeter if the length of the side of the square is *s* is P = s + s + s + s = 4s
Meanwhile, if length of the side of the square is increased by 10%, the perimeter is P = 1.10s + 1.10s + 1.10s + 1.10 = 4.40s

Based on the calculation above, the increase in the perimeter if the sides of the square is increased by 10% is 4.40s - 4.00s = 0.40.

0.40 is 40% in percent form.

Thus, the answer to this problem is 40%.

5) Answer: D

Explanation: A 9 ft. x 10. ft. x 12 ft. wood plank has a volume of 9 x 10 x 12 = 1080 cubic feet. If a cubic foot of the wood plank costs Php 92, then a 1080 cubic feet wood plank will cost 1080 x 92 = Php 99,360.

Therefore, the answer to this problem is Php 99,360.

6) Answer: B

Explanation: The number of 3" x 3" small cardboards that can be cut from a 18" x 12" cardboard can be identified by dividing the area of the larger cardboard (the 18" x 12" cardboard) by the area of the smaller cardboard (the 3" x 3" cardboard).

Area of larger cardboard: 18" x 12" = 216 square inches
Area of smaller cardboard: 3" x 3" = 9 square inches

$$\frac{Area\ of\ larger\ cardboard}{Area\ of\ smaller\ cardboard} = \frac{216}{9} = 24$$

This means that 24 smaller cardboards can be derived from the larger cardboard.

7) Answer: B

Explanation: Using PEMDAS, we need to perform Multiplication and Division (MD) first. However, since division appeared first from the left before multiplication, we prioritize division first over multiplication.

54 ÷ 3 x 9 + 2

Now, we can perform multiplication:

18 x 9 + 2

162 + 2

Lastly, we add the remaining numbers:

162 + 2 = 164

Thus, the correct answer is 164.

8) Answer: C

Explanation:

Method 1: Using the FOIL method

$(2 - 3x)^2$ can be expanded as $(2 - 3x)(2 - 3x)$.

We can now multiply these binomials using the FOIL method:

First terms: $(2)(2) = 4$
Outer terms: $2(-3x) = -6x$
Inner terms: $(-3x)(2) = -6x$
Last terms: $(-3x)(-3x) = 9x^2$

Combining the results above:
$4 + (-6x) + (-6x) + 9x^2$
$4 + (-12x) + 9x^2$
$4 - 12x + 9x^2$

Thus, the answer is $4 - 12x + 9x^2$

Method 2: Using square of binomial

To expand $(2 - 3x)^2$:
- Square the first term: $(2)^2 = 4$
- Multiply the product of the first and second term by 2: $2(2)(-3x) = -12x$
- Square the second term: $(-3x)^2 = 9x^2$

Lastly, combine the results:
$4 + (-12x) + 9x^2$
$4 - 12x + 9x^2$

To get more Civil Service Exam
review materials, visit
https://filipiknow.net/civil-service-reviewer/

To God be the glory!

Thus, the answer is 4 - 12x + 9x²

9) Answer: C

Explanation: The problem stated that the average number of marbles that Luke, Merry, and Matt have is 22. We can express this mathematically as:

$$average = \frac{sum\ of\ marbles\ of\ Luke,\ Merry,\ and\ Matt}{3}$$

$$22 = \frac{sum\ of\ marbles\ of\ Luke,\ Merry,\ and\ Matt}{3}$$

Multiplying both sides of the equation above by 3:

$$22(3) = sum\ of\ marbles\ of\ Luke,\ Merry,\ and\ Matt$$
$$66 = sum\ of\ marbles\ of\ Luke,\ Merry,\ and\ Matt$$

From our computation above, we can conclude that the sum of marbles of Luke, Merry, and Matt is 66. This means that if Matt has 23 marbles, then the total marbles that Luke and Merry have is 66 - 23 = 43.

Thus, the answer to this problem is 43.

10) Answer: B

Explanation: Let *x* be the total sales of the eatery in the morning. Since the eatery gained a total sales in the afternoon twice as large as the total sales in the morning, then we can express that the total sales of the eatery in the afternoon is *2x*.

Thus, we have:

Morning sales: *x*
Afternoon sales: *2x*

According to the problem, the total sales on that day is 6,900. Thus, we have:

Morning sales + Afternoon sales = 6,900

Using the representations we have above:
x + 2x = 6900
3x = 6900   *Combining like terms*
3x/3 = 6900/3   *Divide both sides of the equation by 3*
x = 2300

Since *x* represents the morning sales of the eatery, then the eatery earned Php 2,300 in the morning.

11) Answer: D

Explanation: Let *x* be Lorna's age in the present. If Athena is 21 years younger than Lorna, then we can express Athena's age as *x - 21*.

7 years ago means that Lorna's age must be *x - 7*. Meanwhile, Athena's age 7 years ago must be *(x - 21) - 7 = x - 28*.

Let us tabulate what we have derived above:

	Present	**7 years ago**
Lorna	x	x - 7

Athena	x - 21	x - 28
Total		69

According to the given problem, the sum of Lorna's and Athena's age 7 years ago is 69. Thus, we have:

$(x - 7) + (x - 28) = 69$
$2x - 35 = 69$ *Combining like terms*
$2x = 35 + 69$ *Transposition method*
$2x = 104$
$2x/2 = 104/2$ *Divide both sides of the equation by 2*
$x = 52$

Since *x* represents Lorna's age at the present, then Lorna is currently 52 years old. Since *x - 21* represents Athena's age at the present, then Athena is (52) - 21 = 31 years old at the present.

Thus, the answer is 31.

12) Answer: B

Explanation: Let *x* be the length of the shortest side of the triangle. According to the given problem, the longest side of the triangle is three times as long as the shortest side. Thus, we can express the length of the longest side as *3x*.

Note also that the problem states that one side of the triangle is 13 cm long and its perimeter is 33 cm. Thus, we have this equation:

P = a + b + c   *(where a, b, and c are the sides of the triangle)*
33 = x + 3x + 13

Using the equation above, let us solve for x:

33 = x + 3x + 13
x + 3x + 13 = 33
4x + 13 = 33   *Combining like terms*
4x = -13 + 33   *Transposition method*
4x = 20
4x/4 = 20/4   *Dividing both sides of the equation by 4*
x = 5

Since *x* represents the length of the shortest side, then the shortest side of the triangle is 5 cm. Thus, the length of the longest side must be 5 x 3 = 15 cm.

The answer is 15 cm.

13) Answer: D

Explanation: Let us identify first how long is the side of a 121-m^2 square.

$A = s^2$ *Area of a square*
$121 = s^2$ *The given area of the squares is 121 m^2*
$\sqrt{121} = \sqrt{s^2}$ *Take the square root of both sides of the equation*
$11 = s$
$s = 11$

From our computation above, the length of a side of the square is 11 meters.

Let us construct two squares with sides of 11 meters and let us placed them side by side:
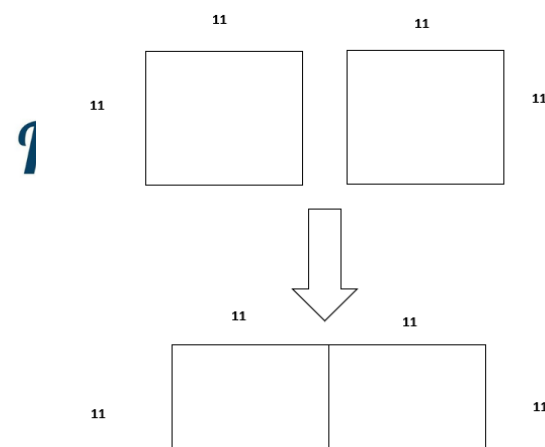
Service Exam
ials, visit
et/civil-service-
er/

To God be the glory!

As you can see, we have formed a rectangle with a length of 11 m + 11 m = 22 m and a width of 11 m.

Length = 22 m
Width = 11 m

Let us compute for the perimeter of the rectangle.

P = 2L + 2W
P = 2(22) + 2(11)
P = 44 + 22
P = 66

Thus, the perimeter of the rectangle is 66 meters.

14) Answer: B

Explanation: Let *x* be the factor that when multiplied to each member of the ratio, the result will provide us with the actual measurement of the sides of the triangle.

Thus, we can express the measurements of the sides of the triangle as:

First side = 5x
Second side = 9x
Third side = 14x

According to the given problem, the perimeter of the triangle is 84. Thus, we have:
first side + second side + third side = 84

5x + 9x + 14x = 84	
28x = 84	*Combining like terms*
28x/28 = 84/28	*Divide both sides of the equation by 3*
x = 3	

The factor that we have obtained is 3.

So, we multiply each part of the ratio by 3 to obtain the actual measurement of the sides of the triangle.

First side = 5x = 5(3) = 15
Second side = 9x = 9(3) = 27
Third side = 14x = 14(3) = 42

It is clear that the shortest side of the triangle measures 15 cm.

15) Answer: B

Explanation: Let *x* be the first odd number. Since we are dealing with consecutive odd numbers (or numbers that follow each other), then the second odd number can be expressed as *x + 2* (note that to get the next odd number to a given number, we add 2 to the latter; for instance, the next odd number from 1 is 3 since 1 + 2 = 3). Moreover, the third odd number can be expressed as *(x + 2) + 2 = x + 4*

Therefore, we have the following:
First odd number: x
Second odd number: x + 2
Third odd number: x + 4

The sum of these numbers is 141, so we have this equation:
x + (x + 2) + (x + 4) = 141
3x + 6 = 141   *Combining like terms*
3x = -6 + 141   *Transposition method*
3x = 135
3x/3 = 135/3   *Divide both sides of the equation by 3*
x = 45

Since *x* represents the first odd number, then 45 is the first odd number among the three. It follows that the remaining odd numbers are 47 and 49.

The smallest among these three is 45.

16) Answer: B

Explanation: Given the rates of two people to finish a certain task alone, then the required time for them to finish the same task if they work together is given by the formula:

$$\frac{1}{a} + \frac{1}{b} = \frac{1}{x}$$

Where *a* refers to the time it takes for the first person to finish the task, *b* refers to the time it takes for the second person to finish the same task, and *x* refers to the time it takes for both persons to finish the same task if they work together.

Applying this formula to our given problem:

$$\frac{1}{Letty} + \frac{1}{Jelyn} = \frac{1}{Letty\ and\ Jelyn}$$

According to the given problem, Letty can finish polishing the entire hall for 4 hours. Meanwhile, Jelyn can finish the same task in 2.5 hours.

2.5 is equal to 2 ½ or 3/2 in improper fraction form. We let x as the time it takes for Letty and Jelyn to finish polishing the hall if they work together.

Therefore, we have:

$$\frac{1}{4} + \frac{1}{\frac{5}{2}} = \frac{1}{x}$$

Take note that we can express $\frac{1}{\frac{5}{2}}$ as ⅖ since $\frac{1}{\frac{5}{2}}$ is equal to $1 \div \frac{5}{2} = 1 \times \frac{2}{5} = \frac{2}{5}$.

So, we have: $\frac{1}{4} + \frac{2}{5} = \frac{1}{x}$

Let us multiply both sides of the equation by LCD (which is 12x) to remove the denominators:

$$20x(\frac{1}{4} + \frac{2}{5}) = 20x(\frac{1}{x})$$

$\frac{20x}{4} + \frac{40x}{5} = 20$ *Distributive property*

$$5x + 8x = 20$$

13x = 20	*Combining like terms*
13x/13 = 20/13	*Divide both sides of the equation by 11*

x = 20/13

From our calculation above, if Letty and Jelyn work together, they can finish polishing the hall in 20/13 hours. 20/13 is equal to 1 7/13 hours in mixed number form.

Thus, the answer is 1 7/13 hours.

17) Answer: B

Explanation: If 15 stamps costs Php 420, then it means that a stamp would cost 420/15 = Php 28. This means that 6 stamps will cost 28 x 6 = Php 168

The answer is Php 168.

18) Answer: A

Explanation:

If we plug in y = 14 to the equation 2y + 5x = 19, then we have:

2y + 5x = 19	
2(14) + 5x = 19	*Substitute y = 14 to the equation*
28 + 5x = 19	
5x = -28 + 19	*Transposition method*
5x = -9	

5x/5 = -9/5   *Divide both sides of the equation by 5*
x = -9/5

Thus, the value of *x* is -9/5.

19) Answer: B

Explanation: Let *x* be the number of pots that Store A sold. If Store B had sold ¾ of the total number of pots that Store A had sold, then we can express the number of pots that Store B had sold as $\frac{3}{4}x$.

The problem states that the total number of pots that the two stores have sold is 490. Thus, we have:

Store A + Store B = 490

$x + \frac{3}{4}x = 490$

To make it easier for us to solve the equation above, let us multiply both sides of the equation by the LCD which is 4:

$4(x + \frac{3}{4}x) = 490(4)$

$4x + 3x = 1960$ *Distributive property*
$7x = 1960$ *Combining like terms*
7x/7 = 1960/7   *Divide both sides of the equation by 7*
x = 280

Since *x* represents the number of pots that Store A had sold, then Store A had sold 280 pots.

20) Answer: D

Explanation: Two angles are supplementary if and only if the sum of the measurements of their angles is 180 degrees.

Let *x* be the factor that must be multiplied to each member of the ratio 1 : 3 to get the actual measurements of the angles.

Thus, we have:

Angle 1: 1x
Angle 2: 3x

Since these angles are supplementary, then the sum of their measurements must be 180:

Angle 1 + Angle 2 = 180°

Using the variables we have set earlier:
1x + 3x = 180
4x = 180   *Combining like terms*
4x/4 = 180/4
x = 45

This means that the factor we are looking for to find the actual measurement of the angles is 45.

Thus, we have:

Angle 1: 1x = 1(45) = 45°
Angle 2: 3x = 3(45) = 135°

Thus, the measurement of the two supplementary angles are 45° and 135°. The larger between the two is 135°.