

**1) Answer: B**

**Explanation:** To identify the perimeter of the square, we must identify first the measurement of its side.

The area of a square is given by the formula:  $A = s^2$

The problem mentioned that the area of the square is  $81 \text{ cm}^2$ . Hence, we can compute for the length of the side by taking the square root of 81:

$$81 = s^2$$

$$\sqrt{81} = \sqrt{s^2}$$

$$s = 9$$

From our computation above, the length of the side of the square is 9 cm.

Note that the formula for the perimeter of a square is  $P = 4s$ . Since we have already computed that  $s = 9$ , then:

$$P = 4s$$

$$P = 4(9)$$

$$P = 36$$

Thus, the perimeter of the square is 36 cm

**2) Answer: C**

**Explanation:** Let  $x$  be the width of the rectangle. Since the length of the rectangle is 5 meters longer than the width, then we can express the length as  $x + 5$ .



## Numerical Ability Answer Key

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So we have:

Length (L) :  $x + 5$

Width (W):  $x$

According to the given problem, the perimeter of the rectangle is 50 meters. Thus, we have:

$$P = 2L + 2W$$

*Formula for the perimeter of a rectangle*

$$50 = 2L + 2W$$

*The perimeter of the rectangle is 50*

Using the expressions we have derived earlier for the length and the width of the rectangle:

$$50 = 2(x + 5) + 2(x)$$

Simplifying the equation above:

$$50 = 2x + 10 + 2x$$

Combining like terms:

$$50 = 4x + 10$$

$$4x + 10 = 50$$

We can transpose 10 to the right-hand side of the equation:

$$4x = -10 + 50$$

$$4x = 40$$

Dividing both sides of the equation by 4:

$$4x/4 = 40/4$$



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$$x = 10$$

From our computation above, the value of  $x$  is 10. Since  $x$  represents the width of the rectangle, then the width is 10 meters long. On the other hand, since  $x + 5$  represents the length of the rectangle, then the length is  $(10) + 5 = 15$ .

Hence, we have  $L = 15$  and  $W = 10$ .

To calculate the area of the rectangle:

$$\begin{aligned} A &= LW && \text{Formula for the area of a rectangle} \\ A &= (15)(10) \\ A &= 150 \end{aligned}$$

Thus, the area of the rectangle is 150 square meters.

### 3) Answer: D

**Explanation:** The cost of Dr. Mariano's land depends on its area. If the dimensions of the land is 20 ft. x 18 ft, then its area should be  $A = 20(18) = 360$  square feet.

If every square foot of the land costs Php 1000, then the land should cost  $360 \times 1000 =$  Php 360,000.

Thus, the answer is Php 360,000

### 4) Answer: A

**Explanation:** The total amount of water in cubic meters that can fill the aquarium depends on the volume of the aquarium. Recall that the volume of a solid figure (including aquariums) refers to the total space it can occupy. Thus, filling in the aquarium means that we must have a sufficient amount of water equivalent to the total space the aquarium can occupy.

Since the aquarium in the problem has length, width, and depth, then we assume that it is a rectangular prism. Hence, the volume of the rectangle can be computed as:

$$V = l \times w \times h$$

*Formula for volume of a rectangular prism*

$$V = 8 \times 5 \times 3$$

$$V = 120$$

Thus, the volume of the aquarium is  $120 \text{ m}^3$ . This means that there must be  $120 \text{ m}^3$  of water to fill the aquarium.

**5) Answer: A**

**Explanation:** Note that the sum of the interior angles of any triangle is always 180 degrees.

In symbols:

$$\text{Angle 1} + \text{Angle 2} + \text{Angle 3} = 180$$

According to the given problem, the interior angles of the given triangle are in the ratio of 5 : 6 : 7. This means that there is a certain factor that must be multiplied to the members of this ratio so that we can identify the actual measurement of the interior angles.

Let us call this factor  $x$ . This factor must be multiplied to each member of the ratio to find the actual measurements:

$$\text{Angle 1: } 5x$$

Angle 2:  $6x$

Angle:  $7x$

Angle 1 + Angle 2 + Angle 3 = 180

$5x + 6x + 7x = 180$

$18x = 180$

Dividing both sides of the equation by 18:

$18x/18 = 180/18$

$x = 10$

Thus, the value of  $x$  is 10. This means that 10 is the factor we are looking for to identify the actual values of the interior angles.

Let us multiply each member of the ratio by 10 to get the actual measurements of the interior angles:

Angle 1:  $5x = 5(10) = 50$  degrees

Angle 2:  $6x = 6(10) = 60$  degrees

Angle:  $7x = 7(10) = 70$  degrees

Hence, the measurements of the interior angles of the given triangle are 50 degrees, 60 degrees, and 70 degrees. Clearly, the smallest among the three is 50 degrees.

The answer to this problem is 50 degrees.

### 6) Answer: C

**Explanation:** If B is the midpoint of PQ, then segments BP and BQ should be congruent. Furthermore, since B is located in between P and Q, then by the segment addition postulate:



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$$BP + BQ = PQ$$

Note that  $PQ = 42.5$ , so we have

$$BP + BQ = 42.5$$

Moreover, BP and BQ are congruent or have the same value. So, let  $x$  be the measurement of both these segments:

$$x + x = 42.5$$

$$2x = 42.5$$

Dividing both sides of the equation by 2:

$$2x/2 = 42.5x/2$$

$$x = 21.25$$

Since  $x$  represents the length of both BP and BQ, then segment BP is 21.25 units long.

The answer is 21.25.

### 7) Answer: B

**Explanation:** The total number of roosters and hens in Tiffany's small poultry farm is 85. In symbols:

$$\text{roosters} + \text{hens} = 85$$

The given problem stated that the ratio of roosters to hens is 8 : 9. So, if  $x$  is the factor that will give us the actual number of roosters and hens, then we have:



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## Numerical Ability Answer Key

Set 5

roosters:  $8x$

hens:  $9x$

roosters + hens = 85

$8x + 9x = 85$

$17x = 85$

Dividing both sides of the equation by 17:

$17x/17 = 85/17$

$x = 5$

Thus, the factor that we are looking for is 5. Hence, the actual number of roosters and hens can be calculated by:

roosters:  $8x = 8(5) = 40$

hens:  $9x = 9(5) = 45$

Thus, there are 40 roosters and 45 hens in Tiffany's farm.

Since we are looking for the number of roosters, then the answer to this problem is 40.

### 8) Answer: B

**Explanation:** If two angles are supplementary, then the sum of their measurements must be  $180^\circ$ .

Thus, to find the supplement of  $110^\circ$ , we only need to find the measurement of the angle such that when added to  $110^\circ$  the result is  $180^\circ$ .



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## Numerical Ability Answer Key

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$$\text{Supplement} = 180^\circ - 110^\circ$$

$$\text{Supplement} = 70^\circ$$

Thus, the answer is  $70^\circ$ .

### 9) Answer: A

**Explanation:** The number of meters of fencing wire required to enclose the rectangular lot is equivalent to its perimeter. Note that this fencing wire will be placed on the sides of this rectangular lot, so the total length of this wire depends on the sum of lengths of this rectangle (or the perimeter).

The perimeter of a rectangle can be calculated using:

$$P = 2L + 2W$$

We have  $L = 40$  and  $W = 20$ . Thus,

$$P = 2(40) + 2(20)$$

$$P = 80 + 40$$

$$P = 120$$

The answer is 120 meters of fencing wire.

### 10) Answer: D



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**Explanation:** If 15% of the delegates of the said event are editorial cartoonists, then it means that  $100\% - 15\% = 85\%$  of the delegates are non-cartoonists.

So, to find the number of delegates that are non-cartoonists, we just need to find the 85% of 200. To do this, we just need to find the percentage or the product of 85% and 200:

$$200 \times 85\%$$

$$200 \times 0.85 = 170$$

Thus, there are 170 delegates who are non-cartoonists.

### 11) Answer: C

**Explanation:** To ensure that we can calculate the value of  $\frac{15}{\frac{1}{3} + \frac{1}{5}}$  properly, we write this expression horizontally.

Notice that in  $\frac{15}{\frac{1}{3} + \frac{1}{5}}$ , 15 is the numerator while  $\frac{1}{3} + \frac{1}{5}$  is the denominator.

In a fraction written as  $\frac{\text{numerator}}{\text{denominator}}$ , we can rewrite it as  $\text{numerator} \div \text{denominator}$

Hence, we can rewrite  $\frac{15}{\frac{1}{3} + \frac{1}{5}}$  as:

$$15 \div \left(\frac{1}{3} + \frac{1}{5}\right)$$

By PEMDAS, we will perform first the operation inside the parenthesis:



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$$15 \div \left( \frac{1}{3} + \frac{1}{5} \right)$$

$$15 \div \left( \frac{8}{15} \right)$$

Performing the division process:

$$15 \div \left( \frac{8}{15} \right)$$

$$15 \times \left( \frac{15}{8} \right) \quad \text{Change the operation to multiplication then reciprocate the divisor}$$

$$\frac{15}{1} \times \frac{15}{8} = \frac{225}{8}$$

The resulting number is  $\frac{225}{8}$ . In mixed number form, this is  $28 \frac{1}{8}$ .

Therefore, the answer is  $28 \frac{1}{8}$ .

### 12) Answer: D

**Explanation:** The whole pie that Lucy made can be expressed as 1. If Cris ate  $\frac{1}{5}$  of that pie and Jennie ate  $\frac{1}{3}$  of the same pie, then the total part of the pie that was eaten is  $\frac{1}{3} + \frac{1}{5}$

Therefore, the part of the pie that is left can be computed by:

$$1 - \left( \frac{1}{3} + \frac{1}{5} \right)$$

Performing PEMDAS, we do the operation inside the parentheses first:



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$$1 - \left(\frac{1}{3} + \frac{1}{6}\right)$$

$$1 - \left(\frac{8}{15}\right)$$

Note that we can write 1 as 15/15:

$$\frac{15}{15} - \frac{8}{15} = \frac{7}{15}$$

Hence, the part of the pie left is 7/15

### 13) Answer: D

**Explanation:** If Selena gets 5% commission for every bottle of honey she sells and a bottle costs 120, then her commission for every bottle is  $120 \times 0.05 = \text{Php } 6$ .

So, if Selena sold 8 bottles, then her commission is  $8 \times 6 = \text{Php } 48$ .

The answer is Php 48.

### 14) Answer: A

**Explanation:** Let  $x$  be the first number. Since the unknown numbers are consecutive numbers (or numbers that follow each other), then the second number can be expressed as  $x + 1$ .

Since the sum of the consecutive numbers is 71, then we can express our problem as:

$$x + (x + 1) = 71$$

Simplifying the equation above by combining like terms:

$$2x + 1 = 71$$

Solving for the value of  $x$ :

$$2x + 1 = 71$$

$$2x = -1 + 71$$

*Transposition method*

$$2x = 70$$

$$2x/2 = 70/2$$

*Dividing both sides of the equation by 2*

$$x = 35$$

Since  $x$  is the first number, then the first unknown number is 35. This follows that the second number is 36. The product of 35 and 36 is 1260.

Thus, the answer is 1260.

### 15) Answer: D

**Explanation:** An equilateral triangle is a triangle whose sides are all congruent or equal in measurement. So if a side of an equilateral triangle measures 48 cm, then its perimeter is simply  $P = 48 + 48 + 48 = 144$  cm.

Since the equilateral triangle and the square have the same perimeter, then the perimeter of the square is also 144 cm.

This follows that a side of the square measures  $144/4 = 36$  cm.

### 16) Answer: D

**Explanation:** Let us analyze each option to assess whether they are true or not.

(a) This is false since  $(x - y)^2$  is a square of binomial which when expanded is  $x^2 - 2xy + y^2$  and not  $x^2 - y^2$

(b) This is false since  $(x + y)(x + y)$ , when computed using the FOIL method, is equivalent to  $x^2 + 2xy + y^2$

(c) This is false since  $(x + y)(y - x)$ , when computed using the FOIL method, is equal to  $-x^2 + y^2$

(d) This is true since  $(x - y)(x + y)$  is equivalent to  $x^2 - y^2$  using the difference of two squares method.

### 17) Answer: C

**Explanation:** Let  $x$  be the actual number of pigs in the farm. Since there are 100 more chickens than pigs, then we can express the actual number of chickens as  $x + 100$ .

Thus, the ratio of the actual number of pigs to chicken is  $x : x + 100$ .

We can solve for the value of  $x$  using the concept of proportions:

$$1 : 3 = x : x + 100$$

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

$$1(x + 100) = 3(x)$$

Simplifying the expression above:

$$1(x + 100) = 3x$$

$$x + 100 = 3x$$

$$100 = -x + 3x$$

$$100 = 2x$$

$$2x = 100$$

$$2x/2 = 100/2$$

$$x = 50$$

*Transposition method*

*Dividing both sides of the equation by 2*

Since  $x$  represents the number of pigs in the farm, then there are 50 pigs in the small farm.

### 18) Answer: B

**Explanation:** To solve for  $x$ , we isolate those terms with a variable from those without. We do this by applying the transposition method (put all  $x$  terms on the left-hand side while all constant terms on the right-hand side):

$$5 - 3x = 2 + x$$

$$-x - 3x = -5 + 2$$

$$-4x = -3$$

$$-4x/-4 = -3/-4$$

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

*Transposition method*

*Dividing both sides of the equation by -4*

Thus, the value of  $x$  is  $\frac{3}{4}$ .

### 19) Answer: C

**Explanation:** Let  $x$  and  $y$  be the numbers. The problem states that their sum is 139. Thus, our first equation can be written as  $x + y = 139$ .

On the other hand, the problem states that the difference between these numbers is 65. Assuming that  $x$  is larger than  $y$ , then  $x - y = 65$ .

Therefore, we have this system of linear equations:

$$(1) x + y = 139$$

$$(2) x - y = 65$$

We can easily solve this system of equations by solving for  $y$  in terms of  $x$  in equation (1):

$$x + y = 139$$

$$y = 139 - x$$

*Transposition method*

Let us plug in the value of  $y$  we have derived above in equation (2):

$$x - y = 65$$

$$x - (139 - x) = 65$$

$$x - 139 + x = 65$$

$$2x - 139 = 65$$

$$2x = 204$$

$$2x/2 = 204/2$$

$$x = 102$$

*Plug in  $y = 139 - x$*

*Distributive property*

*Combining like terms*

*Divide both sides of the equation by 2*

Since we have assumed earlier that  $x$  is the larger number, then the larger number between the two is 102. If you try to compute for the smaller number, the result will be:

$$102 + y = 139$$

$$y = -102 + 139$$

$$y = 37$$



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Thus, the numbers are 102 and 37. The larger between the two is 102.

### 20) Answer: C

**Explanation:** If there are 104 out of 130 students in a certain college who are not living in the campus dormitory, this means that the percentage of students who are not living in the campus dormitory is  $130 - 104 = 26$  students

This means that 26 students out of 130 are not living in the campus dormitory. Our goal now is to find what percent of 130 is 26. In other words, we are looking for the rate given that the base is 130 and the percentage is 26.

The formula for rate is:

$$\text{Rate} = \text{Percentage} \div \text{Base}$$

$$\text{Rate} = 26 \div 130$$

$$\text{Rate} = \frac{26}{130} = \frac{1}{5} = 0.2$$

The rate we have computed is 0.2 which is 20% in percent form.



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