Numerical Ability
Answer key

Set 1:
Basic Operations

1 . **Answer: C**
Explanation: The cost of the items that Fred bought is equal to: *567 + 430 + 180 = 1177*. To determine the amount of money left to Fred: *2000 - 1177 = 823.*

2. **Answer: D**
Explanation: The problem asked us to determine $\frac{2}{3}$of 5400 (this is the amount of money received by Anton's brother). $\frac{2}{3}$of 5400 also means $\frac{2}{3}$x 5400 ("of" is a signal word for multiplication of fractions). Thus, to compute $\frac{2}{3}$x 5400 without using calculator, start with 2 x 5400 and divide the product by 3:

$$\frac{2}{3}x\ 5400 = \frac{2 \times 5400}{3} = \frac{10800}{3} = 3600$$

3. **Answer: C**
Explanation: You may either change all values in the options into decimal form or fraction form (whichever you find easier) so that you can easily compare the values.

If we change all values into decimal form, we have:

(A) $\frac{5}{6} = 5 \div 6 = 0.83$
(B) 0.90
(C) $\frac{3}{4} = 3 \div 4 = 0.75$
(D) 0.80

Note that from the given options, 0.75 or ¾ has the least value.

4. **Answer: B**
Explanation: Using PEMDAS, we start with the expression inside the parentheses which is $27 - 2^3$. Note that since the terms inside the parenthesis have an exponent, we can then simplify the exponent inside the parenthesis.

$$12 \times (27 - 2^3) \div 4$$
$$12 \times (27 - 8) \div 4$$
$$12 \times (19) \div 4$$

Now, we can perform multiplication:

$$12 \times (19) \div 4$$
$$228 \div 4$$

Lastly, we divide the remaining numbers:

$$228 \div 4$$
$$57$$

5 . Answer: A
Explanation:

$$4m - 19 = 7m - 70$$

Group similar terms:

$$70 - 19 = 7m - 4m$$

Simplify the Left and Right hand side of the equation:

$$51 = 3m$$

Divide both sides by 3:

$$17 = m$$
$$m = 17$$

6. Answer: B
Explanation: To obtain the average of a set of numbers, we divide the sum of these numbers by the total number of addends.

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

The problem asked us to determine the sum of the weights of nine office workers given that the average of their weights is 45 kilos.
Let *X* be the sum of their weights

$$\frac{X}{9} = 45$$

Multiplying both sides by 9:

$$X = 9 \times 45 = 405$$

Thus the sum of their weights is 405 kilos.

7. Answer: D
Explanation:

$$-1^3 + (-2)^3 - (-1)^2$$

Simplifying each term with exponents:

$$-1 + (-8) - (1)$$

Performing the indicated operations from left to right:

$$-9 - 1$$
$$-9 + (-1)$$
$$-10$$

8. Answer: C
Explanation: Cost of one burger: Php 32.50 → Cost of two burgers: $2 \times 32.50 = 65$
Cost of one bottle of juice drink: Php 25.00 →Cost of three bottles of juice drink:
$3 \times 25.00 = 75$
Total amount that Alex paid: 65 + 75 = 140

9. Answer: D
Explanation: We need to simplify the given expression to determine its value:

$$\frac{1}{3} + 2\frac{2}{5}$$

First, transform the mixed fraction into an improper fraction:

$$\frac{1}{3} + \frac{12}{5}$$

Make the fractions similar:

$$\frac{5}{15} + \frac{36}{15}$$

Combine the fractions:

$$\frac{41}{15}$$

We're now going to compare each value in the given options and determine which is not equivalent $\frac{41}{15}$

(A) $\frac{41}{15}$ is clearly equivalent to $\frac{41}{15}$
(B) 2.7333.. is obtained if you divide 41 by 15. Thus, this is equivalent to $\frac{41}{15}$
(C) $2\frac{11}{15}$ is the mixed form of $\frac{41}{15}$

(D) $\frac{43}{15}$ is not equivalent to $\frac{41}{5}$, since $\frac{43}{15}$ has a larger numerator.

Thus, $\frac{43}{15}$ is the value from the options which is not equivalent to $\frac{1}{3} + 2\frac{2}{5}$

10. Answer: A
Explanation:
Let :
3x be the measure of the shortest piece;
4x be the measure of the medium piece; and
5x be the measure of the largest piece.

The sum of the measures of these pieces of ribbon is 150 cm. Thus,

$$3x + 4x + 5x = 150$$
$$12x = 150$$

Dividing both sides by 12:

$$x = \frac{150}{12} \text{ or } x = 12.5$$

Recall that 5*x* represents the measure of the largest piece. Thus,

$$5(12.5) = 62.5$$

11. Answer: B
Explanation: There are two methods you may use to solve for *x* in this problem.

Method 1: Using cross-multiplication

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

$$3(5 + x) = -2(x)$$
$$15 + 3x = -2x$$
$$15 = -2x - 3x$$
$$15 = -5x$$
$$x = -3$$

Method 2: Multiplying both sides by the Least Common Denominator

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

Multiplying both sides of the equation by $3x$:

$$3x(\frac{5+x}{x} = \frac{-2}{3})$$
$$3(5 + x) = -2(x)$$
$$15 + 3x = -2x$$
$$15 = -5x$$
$$x = -3$$

12. Answer: A
Explanation:

$$5 + \frac{1}{m} < 3 - \frac{1}{m}$$

Multiplying both sides of the inequality by *m:*

$$m(5 + \frac{1}{m} < 3 - \frac{1}{m})$$
$$5m + 1 < 3m - 1$$

Group similar terms:

$$5m - 3m < -1 - 1$$

Simplifying the left and right hand side of the inequality:

$$2m < -2$$

Dividing both sides by 2:

$$m < -1$$

13. Answer: D
Explanation:

$\frac{1}{p^2} + \frac{1}{q^2}$ is equivalent to $\frac{q^2 + p^2}{p^2 q^2}$ or $\frac{p^2 + q^2}{(pq)^2}$.

Moreover, $p^2 + q^2 = (p + q)^2 - 2pq$

Thus, $\frac{1}{p^2} + \frac{1}{q^2} = \frac{(p+q)^2 - 2pq}{(pq)^2}$

Since, *p + q = 25 and p x q = pq* = 10. By substitution:

$$\frac{1}{p^2} + \frac{1}{q^2} = \frac{(p+q)^2 - 2pq}{(pq)^2}$$
$$\frac{1}{p^2} + \frac{1}{q^2} = \frac{(25)^2 - 2(10)}{(10)^2}$$
$$\frac{625-20}{100} = \frac{605}{100} = \frac{121}{20}$$

14. Answer: B
Explanation: 0.75% of 0.20 also means *0.75% x 0.20* (recall that "of" is a signal word for multiplication).

To proceed with multiplication:
First, we need to convert 0.75% into decimal form.
To convert percentage into decimal, we just divide the given by 100. However, 0.75 divided by 100 is quite tedious.
The trick here is to move two decimal places to the left of 0.75, the result would be 0.0075.

We can now proceed with multiplication: 0.0075 x 0.20 = 0.0015

15. Answer: B
Explanation: A rose costs $\frac{420}{28}$= Php 15. Three dozen roses is equal to 36 roses (*12 x 3 = 36*).

Thus, the cost of three dozen roses is equal to *36 x 15 = Php 540*

16. Answer: D
Explanation: 45% of 32 is equal to $0.45 \times 32 = 14.4$
From the given options:
(A) 14.4 is clearly equal to 45% of 32
(B) 32% of 45 = 45% of 32 (a% of b = b% of a)
(C) 50% of 28.8 = $\frac{1}{2}(28.8) = 14.4$(50% of a number is equal to $\frac{1}{2}$of the number)

(D) 0.144 x 10 = 1.44 (move one-decimal place to the right of 0.144). This is not equal to 14.4

17. Answer: D

Explanation: To factor out $2a^2 - a - 3$?
Step 1: Multiply the numerical coefficients of the first and last term of the given expression: 2(-3) = -6

Step 2: We have obtained a product of -6 in step 1. Now, think of the factors of -6 such that their sum is equal to the numerical coefficient of the middle term which is -1.
Note that $-3 \times 2 = -6$ and $-3 + 2 = -1$. Therefore, we will use -6 and -1

Step 3: Replace the middle term -a by the factors we have obtained in Step 2.
$2a^2 - a - 3$will be $2a^2 - 3a + 2a - 3$.

Step 4: Group the terms with common factors:

$$2a^2 - 3a + 2a - 3 \rightarrow (2a^2 + 2a) - (3a - 3)$$

Step 5: Factor out the common factors of each groups

$$(2a^2 + 2a) - (3a - 3)$$
$$2a(a + 1) - 3(a + 1)$$

Step 6: Factor out the remaining common factor:

$$(2a - 3)(a + 1)$$

Thus, $2a^2 - a - 3 = (2a - 3)(a + 1)$

18. Answer: A
Explanation:

$$4m^2 - 3(n^3 + 2p^q)$$

Substituting the given values of *m, n, p, and q.*

$$4(-1)^2 - 3((2)^3 + 2(3)^{-2})$$
$$4(1) - 3(8 + 2(\tfrac{1}{9})$$
$$4 - 3(8 + \tfrac{2}{9})$$

$$4 - 3(\frac{72}{9} + \frac{2}{9})$$
$$4 - 3(\frac{74}{9})$$
$$4 - \frac{74}{3}$$
$$\frac{12}{3} - \frac{74}{3} = \frac{-62}{3}$$

19. Answer: D
Explanation:
The formula for the perimeter of a rectangle is: $P = 2l + 2w$
The given rectangle in the problem has a length which is 5 more than its width.
Let w be the width of the rectangle.
Then, the length of the rectangle is $l = 2w + 5$
The perimeter of the rectangle is 58 cm.

$$P = 2l + 2w$$
$$58 = 2(2w + 5) + 2w$$
$$58 = 4w + 10 + 2w$$
$$58 = 6w + 10$$
$$58 - 10 = 6w$$
$$6w = 48$$
$$w = 8$$

The rectangle has a width of 8 *cm*
Meanwhile, the length of the rectangle is $l = 2(8) + 5 = 21\,cm$

Now, to find the area of the rectangle.

$$A = lw$$
$$A = 21(8) = 168\,cm^2$$

20. Answer: D
Explanation: Let X be Alice's grade for the fourth quarter in her Math class.

Since Alice must achieved at least an average of 90 to make it in the honor roll:

$$\frac{89+88+86+X}{4} \geq 90$$

Multiplying both sides by 4:

$$4\left(\frac{89+88+86+X}{4}\right) \geq 4(90)$$
$$89 + 88 + 86 + X \geq 360$$
$$263 + X \geq 360$$
$$X \geq 97$$

Thus, Alice must obtain a grade of 97 or higher to be part of her class' honor roll.