

PROF.K PUBLICATIONS.

LEVEL 100

END OF TERM EXAMS

ANSWER ALL QUESTIONS

Answer all questions in this section

1. If $\mathcal{E} = \{a, b, c, d, e\}$, $P = \{a, b, c\}$ and $Q = \{a, b\}$ which of the following statement is /are true?

I. $Q \subset P$ II. $P^1 \subset Q^1$ III. $P^1 \cup Q^1 = \mathcal{E}$

A. I only B. II only **C. I and II only** D. I, II and III

2. Express 0.315 as a fraction in its lowest term.

A. $\frac{63}{20}$ **B. $\frac{63}{200}$** C. $\frac{36}{200}$ D. $\frac{31}{200}$

3. Evaluate $3\frac{5}{8} - \left(3\frac{2}{3} \div 2\frac{4}{9}\right)$

A. $\frac{3}{8}$ **B. $2\frac{1}{8}$** C. $\frac{53}{200}$ D. $\frac{41}{200}$

4. Two consecutive integers are such that the greater added to twice the smaller gives 52. Find the numbers.

A. 15, 16 B. 16, 17 **C. 17, 18** D. 18, 19

5. Find the truth set of $\frac{1}{2}(3x - 5) < 3x + 2$.

A. $\{x : x > -1\}$ B. $\{x : x < 1\}$ C. $\{x : x < -3\}$ **D. $\{x : x > -3\}$**

6. Three quarters of a number added to two and a half of that number gives 13. Find the number?

A. 4 B. 5 C. 6 D. 7

7. Factorize completely the expression $(h^2 - k^2) - (h+k)$.
- A. $(h - k)^2$ **B. $(h + k)(h - k - 1)$** C. $h^2 - k^2 - 1$ D. $(h+k)(h-k)$
8. Three people shared an amount of ₦300,000.00 in the ratio 1: 2: 3. Find the highest amount received.
- A. ₦50,000.00 B. ₦100,000.00 **C. ₦150,000.00** D. ₦200,000.00
9. Find the product of $(2x + y)$ and $(x - 2y)$
- A. $2x^2 - 2y^2$ **B. $2x^2 - 3xy - 2y^2$** C. $2x^2 - 5xy - 2y^2$ D. $2x^2 + 3xy - 2y^2$
10. Factorize $6ab - 3cd + 3bd - 6ac$.
- A. $3(c - b)(2a + d)$ **B. $3(b - c)(2a + d)$** C. $3(b - c)(2a - d)$ D. $3(c - b)(d - 2a)$
11. Dela has x piece of cake. She gives z pieces of cake to each of her five friends. How many pieces of cake does she have left?
- A. $x - 5z$ B. $x + 5z$ C. $\frac{x}{5-z}$ D. $\frac{5-z}{x}$
12. In a class of 20 students,16 play soccer,12 play hockey and two do not play any of the games soccer,. How many students play only hockey?
- A. 10 B. 8 C. 4 **D. 2**
13. Given that $3(14_x) = 45_x$, find the value of x .
- A. 9 B. 8 **C. 7** D. 6
14. In what modulus is it true that $9+8 = 5$?
- A. mod 10 B. mod 11 **C. mod 12** D. mod 13
15. Given that $f: x \rightarrow x^4 - 3x^2 - 7x + 11$, then find $f(-1)$.
- A. 16** B. -16 C. 17 D. -17

Fill In

16. The intersection of a set and its complement is called..... **Ans. an empty set**
17. $A' \cup A$ is called..... **Ans. universal set**

18. The property of addition $a + (b + c) = (a + b) + c$ illustrated is

Ans. Associativity property

19. The fixed number that is multiplied to a variable is called

Ans. Numerical Coefficient

20. is a relation between two quantities of the same unit. **Ans. ratio**

SECTION B

Answer Only 3 Questions only

Q1. a) Illustrate how you will guide a pupil to use Dienes blocks to evaluate $14 + 26$.

b) Convert 344_{five} to base eight without going through base ten.

Q2.

a) Without using calculators, simplify $\frac{3\left(3\frac{3}{8} + 1\frac{5}{6}\right)}{2\frac{1}{8} - 1\frac{1}{2}}$

b) Copy and complete the table below based on remainders in modulo 7.

	0	1	2	3	4	5	6
Multiplicative inverse							
Additive inverse							

Where you think the inverse does not exist, give a reason.

Q3. a) Factorize completely $2xy - 6mn - 3my + 4nx$

b)

i) Solve the inequality

$$\frac{1}{3}(x + 3) - 2x - 5 > 4\frac{1}{3}$$

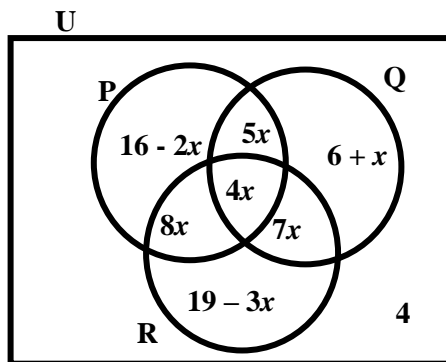
ii) Illustrate the answer on the number line.

Q4)

- a) The development budget of a district council includes expenditure on feeder roads, schools and water supply. The expenditure on roads, schools and water supply are in the ratio 7:15:2. If the expenditure on roads is ₦28 million, find the expenditure on
- Schools
 - Water supply
 - What is the total budget for these three projects?
 - The cost of maintain libraries is ₦900,000.00 and this is met from the expenditure on schools. What percentage, correct to 3 significant figures, of the expenditure on schools is spent on maintain libraries?
- b) The value of a printing machine depreciated each year by 8% of its values at the beginning of that year. If the value of a new machine is 54 million cedis, find its value at the end of the third year.

Q5) a) In the Venn diagram, P , Q , and R are subsets of the universal set U . If $n(U) = 125$, find:

- the value of x ;
- $n(P \cup Q \cap R)$.



b) Suppose $f(x) = 3x + 1$, $g(x) = 2x - 4$ and $h(x) = x + 2$. Show that $(f \circ g) \circ h = f \circ (g \circ h)$.

Marking Scheme

Q1b. Let $(3\ 4\ 4)_5 = (\quad)_8$

Expanding the L.H.S

$$(3 \times 5 + 4) \times 5 + 4$$

Simplifying in base 8

$$\begin{array}{r}
 3 \times 5 = 17_8 \\
 + 4_8 \\
 \hline
 23_8 \times 5_8 = 137_8 \\
 + 4_8 \\
 \hline
 143_8
 \end{array}$$

$$\therefore 344_{five} = 143_8$$

Q2. a)

$$\begin{aligned}
 \frac{\frac{3}{4}\left(3\frac{3}{8} + 1\frac{5}{6}\right)}{2\frac{1}{8} - 1\frac{1}{2}} &= \frac{\frac{3}{4}\left(\frac{27}{8} + \frac{11}{6}\right)}{\frac{17}{8} - \frac{3}{2}} = \frac{\frac{3}{4}\left(\frac{81+44}{24}\right)}{\frac{17-12}{8}} \\
 &= \frac{\frac{3}{4} \times \frac{125}{24}}{\frac{5}{8}} = \frac{3}{4} \times \frac{125}{24} \times \frac{8}{5} \\
 &= \frac{25}{4} = 6\frac{1}{4}
 \end{aligned}$$

b)

	0	1	2	3	4	5	6
Additive inverse	0	6	5	4	3	2	1
Multiplicative inverse		1	4	5	2	3	6

Multiplicative inverse for 0 does not exist because zero cannot multiply a number and is one more than a multiple of 7.

$$\begin{aligned}
 \text{Q3. a) } & 2xy - 6mn - 3my + 4nx \\
 &= 2xy - 3my + 4nx - 6mn \quad [\text{Rearranging}] \\
 &= y(2x - 3m) + 2n(2x - 3m) \\
 &= (2x - 3m)(y + 2n)
 \end{aligned}$$

b)

$$\text{i) } \frac{1}{3}(x+3) - 2(x-5) > 4\frac{1}{3}$$

Multiplying through by 3

$$\Rightarrow 3 \times \frac{1}{3}(x+3) - 3 \times 2(x-5) > 3 \times \frac{15}{3}$$

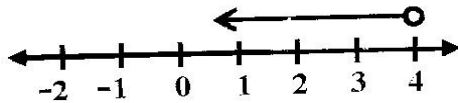
$$\Rightarrow (x+3) - 6(x-5) > 13$$

$$\Rightarrow x - 6x > 13 - 3 - 30$$

$$\Rightarrow -5x > -20$$

$$\Rightarrow x < 4$$

ii)



Q4) a) Ratio of expenditure

= Roads: Schools: Water supply

= 7: 15: 2

Expenditure on roads = ₺28 million and this corresponds to ratio 7

(i) If roads' ratio 7 = ₺28 million, then

$$\begin{aligned} \text{Schools' ratio } 15 &= \frac{15}{7} \times \text{₺28 million} \\ &= \text{₺60 million} \end{aligned}$$

(ii) If roads' ratio 7 = ₺28 million, then

$$\begin{aligned} \text{Water supply, } 2 &= \frac{2}{7} \times \text{₺28 million} \\ &= \text{₺8 million} \end{aligned}$$

(iii) Total budget for the three projects

$$\begin{aligned} &= \text{₺28 million} + \text{₺60 million} + \text{₺8 million} \\ &= \text{₺96 million} \end{aligned}$$

(iv) Expenditure on schools = ₺60 million

Cost of maintaining libraries = ₺900,000

Percentage of the expenditure spent on maintaining libraries

$$= \frac{900,000}{60,000,000} \times 100\% = 1.50\%$$

b) Original value, $V_o = \text{₺54,000,000}$

Rate of depreciation, $R = 8\%$

Period, $n = 3$ years

Value at the end of the third year

$$\begin{aligned}
V &= V_0 \left(1 - \frac{R}{100}\right)^n = 54,000,000 \left(1 - \frac{8}{100}\right)^3 \\
&= 54,000,000 (1 - 0.08)^3 \\
&= 54,000,000 (0.92)^3 \\
&= \text{¢}42,049,152
\end{aligned}$$

Alternative method

Original value of machine = ¢54,000,000

Rate of depreciated = 8%

Value of machine at the end of *first* year

= 92% of original value

$$= \frac{92}{100} \times \text{¢} 54,000,000 = \text{¢}49,680,000$$

Value of machine at the end of *second* year

= 92% of value after *first* year

$$= \frac{92}{100} \times \text{¢}49,680,000 = \text{¢}45,705,600$$

Value of machine at the end of the *Third* year

= 92% of value after second year

$$= \frac{92}{100} \times \text{¢}45,705,600 = \text{¢}42,049,152$$

Q5) a) (i) $n(U) = 125$

$$16 - 2x + 5x + 6 + x + x + 4x + 7x + 19 - 3x + 4 = 125$$

$$20x + 45 = 125$$

$$20x = 125 - 45$$

$$20x = 80$$

$$x = 4$$

(ii) $n(P \cup Q \cap R)$

$$= 16 - 2x + 5x + 6 + x$$

$$= 16 - 2(4) + 5(4) + 6 + 4$$

$$= 16 - 8 + 20 + 6 + 4$$

$$= 38$$

5b) Proof

Consider the L.H.S $(f \circ g) \circ h$

$$\text{But } f \circ g = f(g(x)) = f(2x - 4)$$

$$= (3(2x - 4) + 1) = (6x - 12 + 1)$$

$$= (6x - 11)$$

$$\text{Now } f(g(x)) \circ h = f \circ g(h(x)) = f \circ g(x + 2)$$

Putting $x + 2$ into $f \circ g$

$$= 6(x + 2) - 11$$

$$= 6x + 12 - 11 = 6x + 1$$

$$\therefore (f \circ g) \circ h = 6x + 1 \dots\dots\dots(1)$$

Similarly

Consider the L.H.S $f \circ (g \circ h)$

$$g \circ h = g(h(x)) = g(x + 2)$$

$$= (2(x + 2) - 4) = (2x + 4 - 4) = 2x$$

$$\text{Now } f \circ (g \circ h) = f(g \circ h(x)) = f(2x)$$

$$= 3(2x) + 1 = 6x + 1$$

$$\therefore f \circ (g \circ h) = 6x + 1 \dots\dots\dots(2)$$

Equation(1) is equal to equation (2)