Supplementary Study Materials for Underperforming Schools

## Quantitative Aptitude Class 6

March 2021



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#### **TEACHERS' GUIDE**

#### Dear Teacher,

Quantitate Aptitude is a subject that tests the mental ability of pupils to interpret Patterns, Shapes, Figures, Letters and Codes and how critically they can think in applying these in their everyday activities.

This piece of work is prepared by the Teaching Service Commission (TSC) for the primary school pupils of class 6. The notes are useful for pupils who will be attempting the National Primary School Examination (NPSE) and the aim is to improve learning achievement for weak or underperforming schools at the NPSE nationwide.

The syllabus has been broken down into a total of thirty (30) units in this booklet and every unit is preceded by a Teacher's Guide which clearly explains the techniques used in the samples/examples in the given content.

As a teacher of this subject, you are required to:

- Be very practical in explaining the examples, making sure every pupil is actively involved in the activities.
- Make sure that the samples/examples are clearly explained to the pupils by using the "Think Tank" method that is, allow pupils to make their own contributions.
- Pursue the exercises and self-assessments provided in every unit, to see how adequately pupils are able to understand every activity taught.
- Use teaching aids such as charts, diagrams, drawings and other local materials that may be necessary to facilitate the teaching and learning process.

Thank you so much for carefully following this guide.

#### INTRODUCTION

#### **QUANTITATIVE APTITUDE:**

It is the aspect of mathematics that tests the natural and mental ability to interpret patterns with shapes, figures, letters and signs.

Almost all the units in this work are designed to be taught in a single period of either 35 or 40 minutes as the case may be, except for those that may contain multiple samples which may require an extra period in order to allow the pupils to learn in bits.

#### AIMS AND OBJECTIVES

This work was done to:

- I. Equip teachers and pupils with the materials needed for teaching and learning Quantitative Aptitude
- II. Enable pupils tackle questions successfully in Quantitative Aptitude.
- III. Enable teachers and pupils interpret shapes, diagram, number patterns and codes breaking.

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### UNIT 1 LETTER AND NUMBER CODE 1 REPRESENTATION

#### **LEARNING OUTCOME**

Pupils will be able to: Align letters of a given word to digits of a given number to form words from a given code.

#### **TEACHER'S GUIDE**

The teacher must bear in mind that the letters of the word should align with the digits of the given number, this will enable pupils to form words from numbers and numbers from words.

#### Example

A group of letters can form a word, which corresponds to a certain group of numbers. For example, the word TREMENDOUS represent the number 123456789. Always align the word to the set of numbers as shown below.

#### Example

Which words are represented by the number 12339, 97856, and 6751?

The words are TREES, SOUND and DON'T respectively

#### Solution

- T R E M E N D O U S
- 1 2 3 4 3 5 6 7 8 9

After doing so, it becomes easy to answer any question asked.

#### Exercise 1 NPSE 1999-August

The number **8413507926** is represented by the word **JOURNALIST**. Use this information to answer question 1 to 2.

Which word does the number 8462 represent?
 (A) JUST (B) JOIN (C) JAIL (D) JOTS (E) JARS

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2. Which number represents the word RUST?A) 3152 B) 3126 C) 3462 D) 3096 E) 3062

The number **951736824** is represented by the word **MARKETING**. Use this information to answer question 3 and 4

3. Which number is represented by the word ANGER?

A) 95471 B) 92435 C) 52481 D) 52431 E) 51431

4. Which number is represented by the word RIME?

A) 1582 B) 1863 C) 1893 D) 6893 E) 9823

(NPSE 2016 Q 1 & 2)

The word **TRANSPARENCY** is represented by the numbers **861475163429**. Use this information to answer questions 5 - 11

- 5. What word does the number 51687 represent?A) PARYS B) PARTS C) PERTS D) PANTS E) PARTE
- 6. What word does the number 7816 represent?
  A) SPAR B) STEP C) STAP D) STAR E) SPER (NPSE 2017 Q 4 & 5)
- 7. The number represents the word NECTAR.
  - A) 431816 B) 432826
  - A) The word **REPLACEMENT** is represented by the number 83941236357. Use this information to answer questions that follows.
     (NPSE 2019)
- 8. The number 736943 represents the word.
  A) AMPERE B) MANTLE (C) PALACE D) TEMPER E) TEMPLE
  A) MANTIS B) MANTLE C) MENACE D) MENTAL E) MANTRA

- 9. The number which represents the word PLANE is:
  A) 91534 B) 94135 C) 94153 D) 94315 E) 95431
- 10. The CAMEL is represented by the number:A) 21364 B) 21634 C) 21643 D) 32164 E) 36412
- 11. The word represented by the number 35781523 is:A) ENTRANCE B) EMINENCE C) ENTREATY D) TEMPLATEE) TENEMENT

## SETS (VENN DIAGRAMS)

#### **LEARNING OUTCOME**

UNIT

2

Pupils will be able to: Identify elements of different sets.

#### **TEACHER'S GUIDE**

Teacher to clearly distinguish between geometrical shapes like triangle, rectangle, circle and identify the elements in each set.

A set is a collection of objects put together. Examples of a set: set of even numbers, set of odd numbers, a set of football players or basketball players etc.

Two or more sets can be drawn together in a Venn diagram.

#### **Exercise:**

The diagram below represents the number of pupils who like different cars.

Use it to answer question 1 to 4

The triangle represents pupils who like **BENZ** cars.

The rectangle represents pupils who like MAZDA cars.

The circle represents pupils who like BMW car.



#### Exercise 2

The diagram below represents people who support three different team in Sierra Leone football association (SLFA) premier league tournament.



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Use it to answer the following questions. (NPSE 2019) 1. How many people supported Kakua Rangers only? A) 5 B) 6 C) 7 D) 8 E) 9 2. How many people supported Kambio Eagle only? A) 4 B) 5 C) 6 D) 8 E) 9 3. How many people supported Wusum Stars and Kambio Eagle only? C) 8 D) 9 E) 10 A) 6 **B**) 7

#### Exercise 3

The figure represented the number of pupils who play different games at a school.

CIRCLE: Pupils who play BASKETBALL

RECTANGLE: pupils who play FOOTBALL

TRIANGLE: Pupils who play VOLLEYBALL



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## GAMES AND PUZZLES

#### **LEARNING OUTCOME**

Pupils will be able to: Play simple games that involve the four operations.

#### **TEACHER'S GUIDE**

Teacher must be aware of the operations in all diagrams. The operations used in the first, second and third diagrams are addition, multiplication and division. This might not be the same for other examples.

#### Example

UNIT

3

From the sample below, the first puzzle can add 10 + 13 to get 23 which is the required answer for box – the second box - requires  $\div$  because  $18 \div 6$  is equal to 3. The third puzzle is solved by putting x because  $30 \ge 30$ 

LEARNING OUTCOMES



## NUMBER CODES WITH GEOMETRIC SHAPES

#### **LEARNING OUTCOME**

UNIT

4

Pupils will be able to: Find product and factors of numbers.

#### ADDITION AND MULTIPLICATION

#### **TEACHER'S GUIDE**

Teacher to note that in this operation, to get the number at the centre, multiply the numbers at opposite vertices and add the two results.

Geometric shapes like squares, circles, triangles and so on, may be drawn with number codes inserted in them. Your duty is to study it carefully and interpret it correctly.

#### Example



#### Solution

The numbers are arranged thus:  $2 \ge 7 = 14$   $4 \ge 5 = 20$ . Then 20 + 14 = 34Second:  $4 \ge 6 = 24$ ,  $3 \ge 7 = 21$ Then 24 + 21 = 45Third:  $3 \ge 8 = 245 \ge 9 = 45$ . Then 24 + 45 = 69. Now answer these questions

#### **Exercise** 1





A) 9 B) 27 C) 20 D) 12 E



A) 12 B) 7 C) 8 D) 4 E) 3

## RELATION OF SETS OF NUMBERS

#### **LEARNING OUTCOME**

UNIT

5

Pupils will be able to: Identify set relations involving numbers.

#### **TEACHER'S GUIDE**

The operation is to add a constant difference to one term to get the next.

#### **INTRODUCTION**

When given two or more set of numbers, we can find the similarities or connections between different sets of numbers provided. Quantitative relation of sets of numbers can take different forms.

In this unit, we will learn about the relation of sets of numbers involving addition. Any given set of numbers either have a relation or not.

We are going to look at some numbers to determine whether they are related or not by addition.

#### Example 1

Now look at '2 and 4 and 6' by addition? Are they related? If they are related, what is the relation?

Are these numbers related?

Yes, these numbers are called even numbers and they go up by adding 2 each time. They are also in the two times tables.



#### Example 2

Write 1, 4 and 7

What is the relation between these three numbers?

1 4 7

These numbers go up by adding 3 to get to the next number.



#### Example 3

A = 1, 2, 3; B = 3, 5, 7; C = 4, 7, 10

Which sets (A, B or C) contain numbers that are related?

Let us work through each set.

In set A, what number will you add to 1 give you 2?

The answer is 1. So, let us add throughout set A: (1 + 1 = 2, 2 + 1 = 3): numbers are related by adding 1.

In set B, what number will you add to 3 to give you 5? The answer is 2.

B: 3 + 2 = 5, 5 + 2 = 7', therefore, numbers in set B are related by the adding 2 to get the next term.

In set C, what number will you add to 4 to give you 7?

The answer is 3. So, set C: 4 + 3 = 7, 7 + 3 = 10', therefore, numbers in Set C (4, 7 and 10) are related by adding three to get the next term.

The examples we just worked out show that some sets of numbers are related by addition. Ex. A, B and C are related by addition.

Now use the examples above to answer the following questions below:

#### Exercise 1

Write down the relationships between these set of numbers.

1.	A = 10, 20, 30,, ,
2.	$B = 4, 7, 10, \dots, \dots$
3.	C = 13, 16, 19,,
4.	D = 1, 2, 3;
5.	E = 3, 5, 7;,

6) Find the next two terms.

a.	A = 4, 9 and 14,
b.	$B = 2, 5 and 8 \dots$
c.	C = 45, 50 and 55

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# UNIT<br/>6RELATIONS OF SETS OF NUMBERS<br/>INVOLVING SUBTRACTION

#### **LEARNING OUTCOME**

Pupils will be able to: identify the relation of sets of numbers involving subtraction.

#### **TEACHER'S GUIDE**

Teacher to carefully review the operations before the lesson. The operation involved is subtracting a constant number from one term to get to the next term.

Example 1

Consider the following operations, find out if they are related and how they are related.



There is a relation between the numbers in set A; the relation between 10 and 8 is the subtraction of 2.

Considering set 'B', it can be agreed that there is a relation between the set of numbers. (the relation between '8 and 5' and '5 and 2' is the subtraction of 3, as shown in the diagram)

In set C, the numbers are not related with a constant number by subtraction.

The example we just worked out show that while some set of numbers are related by subtraction (A and B), others are not related by subtraction (C).

#### Example 2

a.	A = 30, 20, 10
b.	B = 12, 8, 4
c.	C = 9, 6, 3

How are the numbers in set A to C related?

#### Solution

- a. The set A's numbers are related by the subtraction of 10.
- b. Set B's numbers are related by subtraction of four (4).
- c. Set C's numbers are related by the subtraction of 3.

#### **Exercise 1**

- 1. Find the relation by subtraction between the following numbers.
  - a. A = 14, 9, 4
    b. B = 12, 8, 4
    c. C = 23, 20, 17
- 2. Are the following sets related or unrelated by subtraction?
  - a. 15, 10, 5 b. 6, 4, 2
- 3. Find the missing number in the following related numbers.

144, 132, ?, 108, 96 a. 102 b. 105 c. 115 d. 120 e. 130

#### UNIT 7 RELATIONS OF SETS OF NUMBERS 1NVOLVING MULTIPLICATION

#### **LEARNING OUTCOME**

Pupils will be able to: Identify the relation between a set of numbers involving multiplication.

#### **TEACHER'S GUIDE**

The operation is to multiply one term by a constant number to get to the next term.

#### **INTRODUCTION**

Look at this set of numbers:

1,	2,	4,	8,			
----	----	----	----	--	--	--

In this set of numbers the common multiplier is 2. So, you multiple each term by 2 to get the net term. Therefore, to get the net term after last number 8 you multiple 8 x 2 = 16 and also multiple 16 x 2 = 32.

Example

Study the diagram below and determine whether the number in each set are related or not by multiplication.

If they are related, how are they related?



There is a relation between the numbers in set A:  $3 \ge 2 = 6$ .

Considering set B:  $1 x^3 = 3$ , 3 x = 9, Yes, they are related by multiplying by 3 In set C the numbers are related by multiplying each term by 2 to next to the number.

#### **Examples:**

a. A = 1, 4, 16b. B = 1, 3, 9c. C = 3, 6, 12

Group these sets of numbers into those that are related by subtraction and those unrelated by multiplication.

#### Note: Teacher

## Walk around the room, check pupils work and have a discussion with them and assist where necessary.

How are the numbers in set A and C related? Raise your hand to answer. (Answer: the set A's numbers are related by multiplying through with 4 and set C's numbers are related by multiplying through with 2).

How are the numbers in set B related?

numbers in set B are related by multiplying by 3

(Answer: we multiplied 1 by 3to give us 3, then we multiplied 3 by 3, to gives us 9.

#### **Exercise 1**

16

1. Find the relation by multiplying between the following numbers: and then find the next 2 terms.

a.	A = 4, 8, 16,
b.	B = 2, 10, 50
c.	
d.	C = 6, 12, 24

## RELATIONS OF SETS OF NUMBERS

#### **LEARNING OUTCOME**

UNIT

8

Pupils will be able to: Identify the relationship between set of numbers involving division.

#### **TEACHER'S GUIDE**

Teacher to understand that each term is divided by a constant number to get to the next term.

Look at this sequence:

48, 24, 12, \_\_\_\_\_

#### Introduction

Any given set of numbers either have a relation or doesn't have a relation.

We are going to look at some numbers to determine whether they are related or not by division.

Study the diagram below and determine whether the number in each set are related or not by division.

If they are related, how are they related? Invite several pupils to answer.



Set **A**: the relation between 12, 6 and 3: divided each time by 2. Considering set **B**: the relation between 9, 3 and 1: divided by 3 to get the next number.

Set **C**: the numbers are **not** related by division. Each subsequent number is not the result of dividing the prior number by a particular number. For example, 32 were divided by 4 to get 8. So, for the set of numbers to be related, 8 would also need to be divided by 4, which would give us 2 and not 4, as shown in the diagram.

To conclude: set (A and B), others are also not related by division (C).

#### Exercise 1

Find the relation between the following numbers:

- 1). A = 16, 8, 4
- 2). B = 50, 10, 2
- 3). C = 16, 8, 2

Pupils to write their answers in their books and work individually. Have pupils exchange their books and check their work while you read the answers aloud.

#### Recap

Are the following sets related or unrelated by division?

a.	16, 4, 1	(Answer: related)
b.	36, 6, 1	(Answer: unrelated)

How do you know the set of numbers in B are unrelated by division? Raise your hand to answer. (Example answer: there is no common number to divide 24 to get 6 and 6 to get 1, you divide 24 by 4 = 6 but 6 divided by 4 is not 1).

In this set of numbers, the relationship between each term to get next number is dividing by 2 to get the next term. So, to get the next term after 12 we divide  $12 \div 2 = 6$  and also divide  $6 \div 2 = 3$ , so the missing number are 6 and 3.

Now use this information to answer the question below.

Note: Always study the connection or relation between the numbers to find or get a constant or common difference.

#### Exercise 2

1.		45, 5,	$\frac{5}{3}$		
	(a) 60	(b) 67 ½	(c) 90	(d) 135	(e) 180
2.	243,	_, 27, 9, 3			
	(a) 30	(b) 45	(c) 81	(d) 108	(e) 126
3.	1024,	, 64, 16,			
	(a) 64, 132,	(b) 256, 35	(c) 256, 4	(d) 4, 256	(e) 4, 144
4.	1000,	, 40, 8			
	(a) 150	(b) 100	(c) 200	(d) 250	(e) 125

## RELATIONS OF SETS OF NUMBERS INVOLVING THE FOUR (4) OPERATIONS

#### **LEARNING OUTCOME**

Pupils will be able to: Identify the relation between two sets of numbers involving the four operations.

#### **TEACHER'S GUIDE**

There are always two sets of ordered pairs of numbers, teacher should relate first numbers of the ordered pairs and the second numbers of the ordered pairs to carefully note the operation, which could be addition, subtraction, multiplication or division.

#### Introduction

UNIT

9

In this lesson, we will be making use of ordered pairs of numbers. Ordered pairs fall within set rules and are written in this form (x, y).

X is the first numbers in the bracket and Y is the second numbers in the brackets.

#### Example 1

1. Draw the example below on the board:



The first number is the x value, of the first pair of numbers in A, should always be related to the first number, or x value of the second pair of numbers in B.

So, in the example above, 3 is related to 6 by multiplying 3 by 2.  $(3 \times 2 = 6)$ 

Also, the second number, the Y value, of the first pair of numbers in A, should always

be related to the second number, or Y value, of the second pair of numbers in B. In the example above, 4 is related to 3 by subtracting 1 from 4.

#### Example 2

Write A (4, 6) and B (6, 2).

Consider these new sets of ordered pair of numbers: A (4, 6) and B (6, 2).

What rule do these pairs of numbers obey? Point to the **X** value of set A and B (4 and 6) What is the relation between these two numbers?

(Example answers: 4 + 2 = 6, therefore, the relation is adding 2). The Y values of set A and B (6 and 2) shows there is a relation between these two numbers.

There are two ways to this:

 $6 \div 3 = 2$ , and 6 - 4 = 2.

Therefore, the relation in the Y values can either be dividing by 3 or subtracting 4.

#### **Example 3**

Let us make 2 ordered pair of numbers and numbers between 1 and 10.

Write (2, 7) and (3, 5).

Give the relation between these ordered pairs.

(Answer: x = x + 1, y = y - 2.

With the X value, 1 was added to 2 arrive at 3 (2 + 1 = 3). With the Y values, 2 was subtracted from 7 to arrive at 5 (7 - 2 = 5).

The relation between the ordered pairs (2,7) and (3,5) is x = +1, y = -2

#### Exercise

1. Find the rule for the following ordered pairs of numbers:

a. A = (1, 4) and (4, 12)

b. B = (5, 9) and (4, 3)

- 2. Using any numbers from and including 1 to 5, write a set of ordered pairs using the rule x = +4,  $y = \div 2$
- 3. What is the rule for the following ordered pairs: (3, 5) (5, 10)? Raise your hand to answer.
- 4. Have pupils to exchange their exercise books and check their work as you read the answer aloud

#### Recap

- 1. We looked at home to identify and write ordered pairs that follow a rule involving the four operations.
- 2. We also found out that some ordered pairs can follow more than one rule.
- 3. Ordered pairs are written in the form (x, y)
- 4. The x value can have a different rule from the y value.

## UNIT 10 NUMBER SERIES

#### **LEARNING OUTCOME**

Pupils will be able to: Identify some patterns that are used to get the next terms.

#### **TEACHER'S GUIDE**

Teacher to carefully study the series to know the pattern used to get the next terms.

A **SERIES** is a set pattern of numbers appearing in a chosen order. Series can be arranged as thus:

- i. Number and square.
- ii. Multiplying the other number by 10, 5, 2, etc.
- iii. By adding 2 to the numerator and 7 to the denominator or any other sequence.
- iv. By multiplying the denominator by 2.
- v. By systematically multiplying with increasing figures.

Always study the first three numbers to get an idea of how to determine subsequent numbers in the series.

The sample below represents a simple series of numbers.

Study it carefully and find the number to fill the space marked "?"

Sample: 2, 4, 8, 16, ?, 64

A) 12 B) 24 C) 32 D) 36 E) 42

The correct answer is 32 as the numbers are multiplied by 2. Answer space C would be shaded.

#### Exercise

Q1) 0.5, 1, 1.5, 2, ?, 3 A) 3.5 B) 2.8 C) 0.5 D) 2.2 E) 1.8 The Sierra Leone Teaching Service Commission

Q2) 5, 25, 4, 16, ?, ?, 2, 4 A) 4, 8 B) 3, 9 C) 3, 6 D) 3, 2 E) 1, 2 Q3) 150, 15, 1.5, 0.15, ?, 0.0015 A) 0.015 B) 0.00015 C) 0.0115 D) 0.115 E) 15000 Q4) (10, 100), (?, ?), (6, 36), (4, 16), (2,4) (NPSE 2016) A) 7, 49 B) 7, 64 C) 8, 16 D) 8, 64 E) 8, 66 Q5)  $\frac{97}{69}$ ,  $\frac{76}{59}$ ,  $\frac{55}{49}$ ,  $\frac{34}{39}$ , ? (NPSE 2016) A)  $\frac{11}{19}$  B)  $\frac{11}{29}$  C)  $\frac{13}{19}$  D)  $\frac{13}{29}$  E)  $\frac{23}{29}$ 

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#### UNIT 11 PATTERNS WITH DIVISION, ADDITION AND SUBTRACTION

#### **LEARNING OUTCOME**

Pupils will be able to: Identify when, where and how addition, division and subtraction are used in the operation.

#### **TEACHER'S GUIDE**

Teacher to study the sample and carefully note how, when and where addition, division and subtraction are being used.

Study the sample below carefully and use it to find the values of each of the samples in the questions that follow (NPSE 2017)

SAMPLE

$ \begin{array}{c c} 10 & 2 \\ 5 & 4 \end{array} $	$(5 + 4) - (10 \div 2) = 9 - 5 = 4$
$\begin{array}{c c} 12 & & 4 \\ \hline 7 & & 3 \end{array}$	$(7 + 3) - (12 \div 4) = 10 - 3 = 7$
$\begin{array}{c} 6 \\ 4 \end{array} \begin{array}{c} 3 \\ 2 \end{array}$	$(4 + 2) - (6 \div 3) = 6 - 2 = 4$

#### Exercise

Q1)	11					
		A) 9	B) 10	C) 11	D) 12	E) 13
Q2)	0 - 10 12 - 4					
		A) 2	B) 5	C) 6	D) 8	E) 9
	11 1					
Q3)	147	. 1		• 1		o 1
	6	A) $1\frac{1}{2}$	B) 2	C) $2\frac{1}{2}$	D) 3	E) $3\frac{1}{2}$
Q4)	$15 \xrightarrow{5} 5^2$					
		A) 2	B) 4	C) 5	D) 6	E) 7
Q5)	$16 \longrightarrow 8$					
		A) 7	B) 9	C) 13	D) 17	E) 23
	6 4 9					

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# UNIT PATTERNS WITH ADDITION AND MULTIPLICATION

#### **LEARNING OUTCOME**

Pupils will be able to: Find the sum and product of numbers either horizontally or vertically with simple shapes.

#### **TEACHER'S GUIDE**

Teacher to understand that the operations are addition and multiplication, we add horizontally and multiply vertically to get the same answer at the centre.

Study the sample carefully and use it to find the value of '?' in the questions that follow (NPSE 2019)

SAMPLE



Exercise



A) 11 B) 12 C) 13 D) 14 E) 26



#### A) 8 B) 9 C) 10 D) 11 E) 12



#### **LEARNING OUTCOME**

Pupils will be able to: Identify the sequence in which some common shapes move from one position to another.

#### **TEACHER'S GUIDE**

Teacher to carefully study the sequence regarding the movement of the shapes.

Some shapes are arranged in a definite pattern called sequencing. Study the sample below and use it to find the shapes represented by '?'



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Another way of sequencing is shown in the sample below


Study the sample above and use it to answer the questions that follow.

Q3)



### **IDENTIFYING CORRECT SHAPES**

#### **LEARNING OUTCOME**

Pupils will be able to: Identify shapes correctly.

#### **TEACHER'S GUIDE**

Teacher should study shapes accurately.

#### Exercise

UNIT

14



# ADDITION, SUBTRACTION AND MULTIPLICATION

#### **LEARNING OUTCOME**

UNIT

15

Pupils will be able to: Find the sum, difference and product of numbers.

#### **TEACHER'S GUIDE**

Teacher to guide pupils to understand where to use addition, subtraction and multiplication on various pattern shapes.



Use the example above to find out the connection between the numbers. Choose the correct answer for each of the questions below.





Study the sample below carefully and use it to find the values of "?" in questions that follow (NPSE 2017 Q 13 to 16)



SAMPLE

34





### PATTERNS WITH SEQUENTIAL ADDITION

#### **LEARNING OUTCOME**

Pupils will be able to: Have the necessary skills of addition whether the sum is given or not.

#### **TEACHER'S GUIDE**

Here, the operation involves addition. Teacher should add where the sum is not given and subtract where the sum is given.

Two or three diagrams with numbers at various points or positions are given as an example. A close study shows how one number is obtained from the others.

Example 1

UNIT

16



In the first diagram 7 + 6 = 13 which is the third number. In the second diagram 3 + 9 = 12, which is the third number? In the third diagram 13 + 8 = 21, which is the third number? Using this principle, we can find the missing numbers indicated by ' \_\_\_\_' in the following diagrams.



#### Example 2



This example shows that the sum of the three numbers outside the circle is equal to the number within the circle.



### SQUARE ROOTS AND ADDITION

#### **LEARNING OUTCOME**

Pupils will be able to: Find the square root of numbers.

#### **TEACHER'S GUIDE**

Teacher should be able to find the square root of numbers.

Using symbols in solving square root of numbers.

#### Example

UNIT

17



In the example above you find the square root of the number on the left of the symbol and then you add the number on the right part of the symbol. So, you will use this method to answer the questions below.

#### **Exercise 1**

Use the sample above to answer the following questions:



# UNIT SQUARE AND ADDITION 18

#### LEARNING OUTCOME

Pupils will be able to: Express the square and square root of numbers

#### **TEACHER'S GUIDE**

Teacher should clearly tell pupils that the opposite of square is square root. it is advisable that the teacher prepares a chart of squares and square root.

Study the example below carefully and use it to answer questions in exercise 1.

Example



In this example you square the bottom and add the top number.

- 1) What is the value of  ${}_{3}S^{3}$ ? 2) What is the value of  ${}_{4}S^{2}$ ? a)10 b) 17 c) 18 d) 20 e) 12
- a) 18 b) 9 c) 12 d) 15 e) 14

- 3) What is the value of <sub>6</sub>S<sup>5</sup>?
  a) 11 b) 17 c) 39 d) 41 e) 4
- 4) What is the value of 2S<sup>11</sup>?
  a) 15 b) 14 c) 13 d)
- 5) What is the value of <sub>0</sub>S<sup>4</sup>?
  a) 0 b) 16 c) 8 d) 5 e) 4
- 6) What is the value of 10 S<sup>10</sup>?
  a) 140 b) 130 c) 120 d) 115 e) 110

### UNIT 19 PATTERNS INVOLVING SEQUENTIAL DIVISION

#### **LEARNING OUTCOME**

Pupils will be able to: Solve simple problems that involve division.

#### **TEACHER'S GUIDE**

Teacher to explain to pupils that the opposite of multiplication is division.

Study the sample below carefully and use it to find the value of "?" in the questions in the Exercise below.

Example

ſ							1			٦
		4	48		28	588		7	174	
		3	12		3/4	21		3	21	
$48 \div 12 = 4$			$588 \div 28 = 21$				147 ÷ 2	1 = 7		
1	2	$\div 4 = 3$	3		28 ÷	21 = 3	/4		21 ÷ 7 =	= 3

In this example you divide the l the top right number by the number on the top left.

Q2)

#### Exercise

Q1)

4	?
9	36

a) 96 b) 98 c) 134 d) 144 e) 15

5	120
48	?

a) 20 b) 22 c) 24 d) 30 e) 40



Q3)

Q4)

10	400
?	40

#### a) 4 b) 6 c) 8 d) 9 e) 10

# UNIT PATTERNS WITH CONTINUOUS 20 MULTIPLICATION

#### **LEARNING OUTCOME**

Pupils will be able to: Do simple operations that involve multiplication.

#### **TEACHER'S GUIDE**

Teacher should note that we multiply factors to get products and when the product is given, we divide to get the factor.

#### SAMPLE



**Exercise 1** find the missing numbers in the following operations







From the example, it is observed that the fourth number is obtained by multiplying together the other three numbers.

In (i)  $2 \times 3 \times 1 = 6$ , which is the fourth number.

In (ii)  $4 \ge 2 \le 5 = 40$ , which is the fourth number.

In (iii)  $7 \ge 3 \ge 105$ , which is the fourth number.

Now apply this rule to the following diagrams to find the missing number.



In (i)  $2 \times 4 \times 3 = 24$ . Therefore 24 goes into the box as the fourth number.

In (ii)  $3 \ge 2 \ge 3$   $6 \ge 30$ . The number to be multiplied by 6 to give you 30 is 5. Therefore 5 goes into the box.

Patterns involving sequential multiplication.

#### Example 3



In the above example, 2 is used as a constant number to multiply. Now use the same method to find the unknown.

#### Exercise 2

Study carefully and use it to find the value of '?' in the questions that follow (NPSE 2019)



## UNIT PATTERNS WITH CONTINUOUS 21 SUBTRACTION

#### **LEARNING OUTCOME**

Pupils be able to: Do simple operations that involve subtraction.

#### **TEACHER'S GUIDE**

Here the operation is subtraction, we find the difference between the numbers on the horizontal line to give us the number at the top of the vertical line.

#### Example



In this pattern, we subtract 21 - 18 = 3, 16 - 12 = 4, 27 - 18 = 9

Now use this example to answer the questions below.





A) 14 B) 51 C) 13 D) 7 E) 45

## VALUES AND PRODUCTS

#### **LEARNING OUTCOME**

UNIT

22

Pupils will be able to: Use simple pattern codes to find product of numbers.

#### **TEACHER'S GUIDE**

Teacher to carefully follow the pattern code to find the product of the numbers.

Sometimes, letters and their coefficients have specific values. Use the example below to answer the questions in Exercise 1.

 $Z_1 = 1 \times 4 = 4$   $Z_2 = 2 \times 5 = 10$  $Z_3 = 3 \times 6 = 18$ 

Q1) Find the value of  $Z_5$ Q3) Find the value of  $Z_3 + Z_1$ Q2) Find the value of  $Z_4 + Z_1$ Q4) Find the value of  $Z_6 - Z_4$ 

Use the example below to answer the questions in Exercise 2.

**Exercise 2** using the example below, select the correct answer from the given options.

 $Q0 = 2^{1} + 0 = 2$   $Q1 = 2^{2} + 1 = 5$   $Q2 = 2^{3} + 2 = 10$   $Q3 = 2^{4} + 3 = 19$   $Q4 = 2^{5} + 4 = 36$ 

- Find the value of Q4 + Q2 Q0
   A) 36 B) 40 C) 44 D) 46 E) 48
- 2) Find the value of  $\frac{Q5 Q3}{Q2 Q1}$ 
  - A) 10 B) 30 C) 24 D) 21 E) 20
- 3) Find the value of  $Q6 \div Q0$ 
  - A) 134 B) 128 C) 67 D) 64 E) 53

Look at the example below and use it to answer questions in Exercise 3

	А	В	С	D
Р	5	4	3	2
Q	2	0	7	6
R	3	1	5	4
S	1	2	3	9

BP x CS = 4 x 3 = 12DS - CS = 9 - 3 = 6

- 1. What is  $DR \div AQ$ ?
- 2. What is CQ x DR?
- 3. What is  $\frac{DR}{CP}$
- 4. What is BQ + BP?

# UNIT REFLECTION 23

#### **LEARNING OUTCOME**

Pupils will be able to: Identify symbols, diagrams and shapes when they are reflected, moved or rotated.

#### **TEACHER'S GUIDE**

Teacher should note that symbols, diagrams and shapes can be moved from one point to another or rotated without changing their forms.

Some shapes in Quantitative Aptitude are drawn literally reflected. See sample below:







#### **LEARNING OUTCOME**

Pupils will be able to: Identify shapes and symbols even when inverted.

#### **TEACHER'S GUIDE**

Teacher to understand that shapes and symbols can be inverted without changing their forms.



#### Exercise 1

Use the example above to find the shape represented by "?" in each question





#### Exercise 2

Use the sample below to answer the questions.



### UNIT 25 CORRESPONDING ADDITION OF NUMBERS

#### **LEARNING OUTCOME**

Pupils will be able to: Add numbers on corresponding sides of shapes.

#### **TEACHER'S GUIDE**

Teacher to carefully explain the meaning of corresponding shapes.

Study the example below carefully and use it to find the numbers represented by "?" in the questions.

#### **Example 1** 9 9 13 8 17 11 19 11 5 15 6 9 Exercise Q1) 17 11 A) 19 B) 6 C) 22 D) 20 E) 17 9 ? Q2) 12 42 A) 16 B) 26 C) 30 D) 54 E) 18 38 ?



#### **Example 2**

Study the example below carefully and use it to find the value of each of the samples in the questions below.





# UNIT 26 PICKING THE ODD

#### **LEARNING OUTCOME**

Pupils will be able to: Identify shapes that are not compatible.

#### **TEACHER'S GUIDE**

Teacher to understand how to identify and compare shapes that are the same.

**Exercise 1** Identify the odd shape.



### UNIT 27 EXPONENTS AND SQUARES OF NUMBERS

#### **LEARNING OUTCOME**

Pupils will be able to: Multiply one number by the square of other numbers.

#### **TEACHER'S GUIDE**

Teacher to understand that the operation here involves multiplying one number by the square of the other number.

Use the sample below to find out what is meant by "\*". Choose the correct answer for each of the problems in the Exercise below.

Example	8*2 = 32
	5*4 = 80
	6*7 = 294

A square is a number multiplied twice by itself.

e.g 4 is the square of 2 ie  $2^2 = 2 \ge 2 = 4$ 9 is the square of 3 100 is the square of 10 etc.

Q1) 3* 4	Q2) 5* 7
a) 10 b) 12 c) 24 d) 16 e) 9	a) 56 b) 40 c) 35 d) 70) e)24
Q3) 12* 9	Q4) 11* 7
a) 117 b) 108 c) 120 d) 216 e) 240	a) 88 b)77 c) 70 d) 154 e) 181

### **OPERATION MACHINES**

#### **LEARNING OUTCOME**

Pupils will be able to: Do simple operations with machines be it addition or subtraction.

#### **TEACHER'S GUIDE**

Teacher should note the operation the machine is using whether it is addition or subtraction.

#### Example

UNIT

28

Look at these operation machines and use the same format to answer the rest of the questions.

#### Exercise

Find the missing numbers and signs.















#### LEARNING OUTCOME

Pupils will be able to: Use the 4 operations to do simple calculations.

MAGIC GAMES

#### **TEACHER'S GUIDE**

Teacher to understand that these games use any of the four numbers operations (that is, +, -, x and  $\div$ )

#### Exercise

UNIT

29

Complete the magic squares.

The sum of all nubers in a row must be equal to sum of numbers in row or diagonal.

	16	3		13	
Q1)	5		11	8	16 + 3 + 2 + 13 = 34 5 + 10 + 11 + 8 = 34
		6	7	12	
	4	15			
	33			30	
Q2)		28	27		33 + 18 + 21 + 30 = 102
		24		29	
	21	31			

1	٦	2	1
L,	Į	Э	J

	Input numbers		کر ×		с+ Д
1	12, 8	20,	96,	4	$1\frac{1}{2}$
2	6, $1\frac{1}{2}$	7, 5	4, 5	9	9
3					
4					
5					
6					
7					

### **ROMAN NUMBERS**

#### **LEARNING OUTCOME**

UNIT

30

Pupils will be able to: Identify and do simple calculations with Roman numbers.

#### **TEACHER'S GUIDE**

Teacher should draw a chart of Roman numbers to explain the symbols represented by the numbers for pupils to understand.

The figures 1, 2, 3, 4, 5... are called Arabic numbers. The basic Roman numbers are I, II, III, IV, V, X, C, D, M

 $1 \ 2 \ 3 \ 4 \ 5 \ 10 \ 100 \ 500 \ 1000$ 

To write six (6) put one (I) after the five (V) which gives VI. One (I) in front of any number is an addition. Example VI means 5 + 1 = 6 (VI); 5 + 2 = 7 (VII) and so on. Ten is written as X. to write nine (9), put 1 before ten(x) which means 10 - 1 = 9(ix). To write eleven (11), put one (1) after the ten (x) i. e 10 + 1 = 11(xi). Fifteen is 10 + 5 i. e x = v = 15(xv). Hundred is C. Ninety is 100 - 10 = 90(XC) and so on. Study and master the table below. These are the Roman and Arabic numbers from 1 to 100.

1	2	3	4	5	6	7	8	9	10
I	II	III	IV	V	VI	VII	VII	IX	X
11	12	13	14	15	16	17	18	19	20
XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
21	22	23	24	25	26	27	28	29	30
XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX	XXX
31	32	33	34	35	36	37	38	39	40
XXXI	XXXII	XXXIII	XXXIV	XXXV	XXXVI	XXXVII	XXXVIII	XXXIX	XL
41	42	43	44	45	46	47	48	49	50
XLI	XLII	XLIII	XLIV	XLV	XLVI	XLVII	XLVIII	XLIX	L

51	52	53	54	55	56	57	58	59	60
LI	LII	LIII	LIV	LV	LVI	LVII	LVIII	LIX	LX
61	62	63	64	65	66	67	68	69	70
LXI	LXII	LXIII	LXIV	LXV	LXVI	LXVII	LXVIII	LXIX	LXX
71	72	73	74	75	76	77	78	79	80
LXXI	LXXII	LXXIII	LXXIV	LXXV	LXXVI	LXXVII	LXXVIII	LXXIX	LXXX
81	82	83	84	85	86	87	88	89	90
LXXXI	LXXXII	LXXXIII	LXXXIV	LXXXV	LXXXVI	LXXXVII	LXXXVIII	LXXXIX	XC
91	92	93	94	95	96	97	98	99	100
XCI	XCII	XCIII	XCIV	XCV	XVI	XCVII	XCVIII	XCIX	C

 $M = 1000 \quad D = 500 \quad C = 100 \ L = 50 \quad X = 10 \quad V = 5 \ I = 1$ 

- 1. Which is the longest Roman Number in the table?
  - a. How many symbols does it have?
  - b. How many symbols are in this Arabic number?
- 2. Do these calculations in Arabic and Roman numerals.
  - a.  $25 \ge 3 =$
  - b.  $42 \div 3 =$
  - c. 15 + 4 =
  - d.  $XXV \times III =$
  - e. XV + IV =
- 3. If M means 1000 and D means 500, what does MMDCCXIX mean?

Answers

#### Answers

#### UNIT 1

Exercise 1

1. Jots 2. B 3. D 4. C 5. B 6. D 7. B 8. E 9. C 10. B 11.A

#### UNIT 2

Exercise 1

1. D 2. A 3. D 4. C

#### UNIT 4

1. E 2. A 3. C

#### UNIT 5

1. add 10	2. add 3	3. Add 3	4. add 1	5. add 2
6 a. 19, 24	b. 11, 14	c. 60, 65		

#### UNIT 6

a) Subtract 5 b) Subtract 4 c) Subtract 3

#### UNIT 7

1. TIMES 2 2. TIMES 5 3. TIMES 2

#### UNIT 8

1. Divide by 2 2. Divide by 5 3. No relation

#### UNIT 9

a) add 3 (x -axis) and times 3(Y-axis) b) minus 1 (X – axis) and divide by 3 or -6

#### **UNIT 10**

1. ADD 5 2. (3, 9) 3. Divide by 10 4. (8, 64) 5. 13/29

Not for sale
UNIT	11							
	1. B	2. E	3. E	<b>4.</b> E	5. C			
UNIT	<b>15</b> 1. E	2. D						
UNIT	16							
Exerci	ise 1							
	1). 15	2) 4	3)	8				
Exerci	ise 2							
	1) 7	2) 13	3 3)	9	4) 9			
UNIT	18							
	1. E	2. A		3. D	4. A	5.	E	6. E
UNIT	19							
	1. D	2. C		3. D	4. A			
UNIT	20							
	Exercie	ce 2.	1. A	2.	C			
UNIT	21							
	1. A	2. D	)	3. B				
UNIT	22							
	1.40	2.44	4	3.22	4.36	5.44	6. A	7. E
UNIT	23							
	1. E	2. A		3. B	4. B			
UNIT	24							
	1.	С	2. D		3. A	4. C		

Answers

UNIT	25				
	1. A	23. A	3. B		
UNIT	26				
	1. C	2. E	3. D	4. C	
UNIT	27				
	1. B	2. C	3. B	4. B	
UNIT	28				
	1. $1I - 6 = 12$		2.0	3. 126-7 = 9 4. 189	5.9+11
	OR 10 + 10, etc.		6. 28 + 11 =		
UNIT	30				
	1a. LXXX 2a. LXXV 2e. LX	XVII 1b. 8	2b. CXXVI	2C. XIX	2d. LXXV

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## REFERENCE

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