
بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

Part-II (General Ability) 40 Marks

VI. Quantitative Ability/Reasoning

DEDMAS
Power's Rules

· Basic Mathematical Skills.

· Concepts and ability to reasons quantitatively and solve problems in a quantitative setting.

· Basic Arithmetic, Algebra and Geometry (Average, Ratios, Rates, Percentage, Angles, Triangles, Sets, Remainders, Equations, Symbols, Rounding of Numbers

① Numbers
② Age problems

· Random Sampling

Probability
↳ Questions → Dice, Coin, cards.

VII. Logical Reasoning and Analytical Reasoning/Ability

· **Logical Reasoning** includes the process of using a rational, systematic series of steps based on sound mathematical procedures and given statements to arrive at a conclusion

· **Analytical Reasoning/Ability** includes visualizing, articulating and solving both complex and uncomplicated problems and concepts and making decisions that are sensible based on available information, including demonstration of the ability to apply logical thinking to gathering and analyzing information.

VIII. Mental Abilities

· Mental Abilities Scales that measures specific constructs such as verbal, mechanical, numerical and social ability.

(A) Real Numbers ✓

i) Whole Numbers = 0, 1, 2, 3, 4, 5.....

ii) Natural Num = 1, 2, 3, 4, 5, 6, ...

iii) Even Num = 2, 4, 6, 8, 10, ----

iv) odd Num = 1, 3, 5, 7, 9, ---

(v) Prime Num → (1) Divided by itself
(2) Divided by one

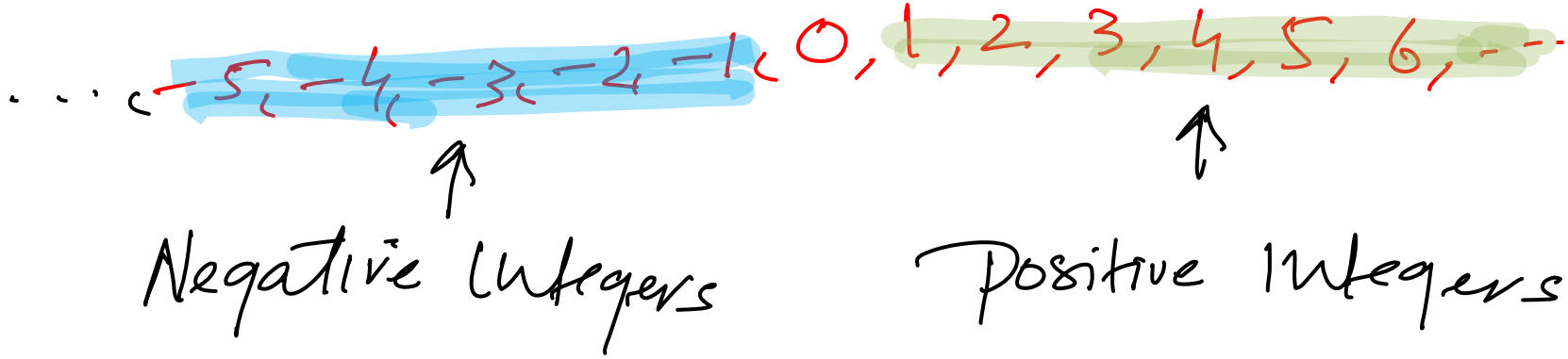
eg = 2, 3, 5, 7, 11, 13, 17, 19, 23, ...

Note ⇒ Having only two factors

→ Composite Numbers → Having more than two factors:

eg① 4, 6, 8, 9, 10, 12, 14, 15....

⇒ Integers (z) = 0, ±1, ±2, ±3, ±4...



⇒ Real Numbers ✓

① Rational Numbers

(i)

⇒ Which are in the form of

p/q, $q \neq 0$.

eg ① $\frac{2}{3}$, $\frac{5}{7}$, $\frac{27}{8}$, ...

(ii) Decimal form:

① Terminating after decimal point

eg = 2.25, 7.12224467

(ii) Non-Terminating but recurring:

eg (1) $2.3333333\ldots\ldots$

(2) $4.25252525\ldots\ldots$

(2) Irrational Numbers:

(i) in the under-root form.

eg (1) $\sqrt{5}$, $\sqrt{17}$, $\sqrt{43}$, ...

Note: Not in $\frac{p}{q}$, form.

(ii) Decimal form:

(a) Non-Terminating & Non-Recurring

eg(1) $\frac{22}{7} = 3.142857142857\ldots$

(2) $5.2316784567\ldots$

(B) Imaginary Numbers :

$\Rightarrow$ Form $\Rightarrow$ $\sqrt{-ve(z)} = \sqrt{-ve\ Number}$

eg① $\sqrt{-5}$, $\sqrt{-19}$, etc

Concept = iota $\Rightarrow$ $i = \sqrt{-1}$

$-5 = -1 \times 5$

$(i)^2 = (\sqrt{-1})^2$

$\boxed{i^2 = -1}$

$\Rightarrow \sqrt{-5} = \sqrt{-1 \times 5} = \sqrt{-1} \times \sqrt{5} = i\sqrt{5}$

eg ② $\sqrt{-25}$

$\therefore \sqrt{AB} = \sqrt{A} \times \sqrt{B}$ ✓

$\sqrt{(A+B)} \neq \sqrt{A} + \sqrt{B}$

$-25 = -1 \times 25$

$\Rightarrow \sqrt{-1 \times 25} = \sqrt{-1} \times \sqrt{25}$

$i = \sqrt{-1}$

$= i \times \sqrt{25}$

$25 = 5 \times 5 = 5^2$

$= i \times \sqrt{5^2}$

$\sqrt{\ } = \frac{1}{2}$

$= \underline{\underline{5i}}$ Ans:

(c) Complex Numbers

(1) Real ± (2) Imaginary

Form ⇒ $a \pm ib$

a ↑ Real(R)

ib ↑ Imaginary (I)

eg(1) $5 + 3i$

5 ↑ R

$3i$ ↑ I

⇒ (i) Addition/subtraction of Complex Numbers:

eg (1) $(2+3i)+(1+2i)$

Real ± Real & Imag ± Imag:

$\Rightarrow (2+3i)+(1+2i) = 2+1+3i+2i$

$= \underline{3+5i}$ Ans:

(ii) Multiplication/product:

eg ① $(2+3i)(1+2i)$

$2\times1 + 2\times2i + 3i\times1 + 3i\times2i$ $\quad \therefore i\times i = i^2$

$2 + 4i + 3i + 6i^2$

$i^2 = -1$

$2 + 7i + 6(-1)$

$2 + 7i - 6 \Rightarrow -4 + 7i$ Ans:

⇒ Conjugate of complex Number:

Q① find the conjugate of $1+2i$?

Sol:- $\overline{1+2i} \Rightarrow 1-2i$ Ans:

eg $\overline{5-3i} = 5+3i$ ✓

Division :- Rationalization

eg ① $\frac{(2+3i)}{(1-2i)}$ → Num.
→ Deno.

1st step = Taking conjugate of Denominator

$\Rightarrow \overline{1-2i} = 1+2i$

2nd step = Now multiply & divide the conjugate with original factors

$\Rightarrow \left(\frac{2+3i}{1-2i}\right) \times \left(\frac{1+2i}{1+2i}\right)$

$\Rightarrow \frac{(2+3i)(1+2i)}{(1-2i)(1+2i)}$

Next Page :

$$\frac{(2+3i)(1+2i)}{(1-2i)(1+2i)} = \frac{-4+7i}{1^2-(2i)^2}$$

$(a-b)(a+b)$

$$a^2-b^2=(a+b)(a-b)$$

H.w ⇒ Past papers

Solve

$$\Rightarrow \frac{-4+7i}{1-4i^2} \quad \because (2i)^2 = 4i^2$$

$$i^2 = -1$$

$$= \frac{-4+7i}{1-4(-1)} = \frac{-4+7i}{1+4}$$

$$\Rightarrow \frac{-4+7i}{5} \text{ or } \frac{-4}{5} + \frac{7i}{5}$$

⇒ Square Root values

a) Perfect square Root values

b) Imperfect square Root values:

⇒ Perfect Sq. Root...

Numbers → Two identical pairs

eg① $1^2 = 1 \times 1$

$4 = 2 \times 2$

$9 = 3 \times 3$

$16 = 4 \times 4$

⋮

$144 = 12 \times 12$

$169 = 13 \times 13$

⋮

eg① $\sqrt{121} = \sqrt{11 \times 11} = \sqrt{11^2} = 11$

⇒ How to check for a perfect square root :→ Factorization

eg① $\sqrt{484} = \sqrt{22^2} = 22$

2	484
2	242
11	121
	11

⇒ $484 = 2 \times 2 \times 11 \times 11 = (2 \times 11)(2 \times 11)$

$= 22 \times 22 = 22^2$

$\Rightarrow$ (i) $\sqrt{3025}$

5	3025
5	605
11	121
	11

$3025 = 5 \times 5 \times 11 \times 11$

$= (5 \times 11)(5 \times 11)$

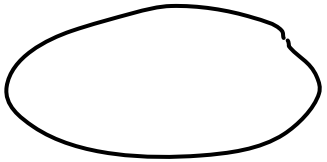
$= 55 \times 55$

$3025 = 55^2$

$\sqrt{3025} = \sqrt{55^2} = 55$ Ans: 2

② Imperfect square Root values:

↳ Not having two identical pairs:

eg ① $\sqrt{11}$ = 

$16 = 4$

↑

$11 = 3 \circ 3$

↓

$q = 3$

Next page:

$\Rightarrow \sqrt{11}$ $\Rightarrow$ $\log_{10} C = \dfrac{x+y}{2\sqrt{y}}$

$x = 11$, $y = 9$

x = Whose square root is required

y = Nearest perfect square to x.

$\dfrac{11+9}{2\sqrt{9}} = \dfrac{20}{2 \times 3}$

$\Rightarrow \dfrac{10}{3} = 3.33$ Ans

9, 10, 11, 12, 13, 14, 15, 16

3^2 4^2

$\sqrt{43} = (\quad)$

$\Rightarrow \sqrt{43}$

$$\frac{x+y}{2\sqrt{y}}$$

$x = 43$, $y = 49$

43 → $49 = 7^2$ ✓

43 → $36 = 6^2$

$$\Rightarrow \frac{43+49}{2\sqrt{49}} = \frac{92}{2 \times 7}$$

$$= \frac{46}{7} = 6.57$$

$$\sqrt{49} = \sqrt{7^2} = 7$$

$$7 \overline{)46}\ 6.57$$
$$42$$
$$40$$
$$35$$
$$50$$

Ans:

⇒ cube Root values → H.W ✓

→ CSS – 2025 Q8(d) ✓

Done

⇒ Rules of equality ⇒

LHS = RHS ⇒ Balanced form

$-x+ = +x-$

⇒ PEDMAS / BODMAS :

1) P/B = [{ ( ) }] ✓
2) E/O → Power of $\frac{2}{}$
3) D → ÷
4) M → x
5) A → +
6) S → −

Cube Root values = $\sqrt[3]{\ }$ = $\frac{1}{3}$

⇒ (1) Perfect cube Root:

eg(1) $1^3 = 1$

$2^3 = 8$

$3^3 = 27$

$4^3 = 64$ ✓

$5^3 = 125$

$6^3 = 216$

$7^3 = 343$

$8^3 = 512$

$9^3 = 729$

$10^3 = 1000$ ✓

$5 \times 5 \times 5 = 125$

(2) Imperfect cube Root values:

Logic.

$$\sqrt[3]{x} = \sqrt[3]{y} + \frac{x - y}{3\left[\sqrt[3]{y}\right]^2}$$

$x \rightarrow$ Whose cube root is required.

$y \rightarrow$ Nearest perfect cube to x:

$\Rightarrow \sqrt[3]{79}$

$x = 79$

$y = 64$

$\sqrt[3]{64}$

4

$\sqrt[3]{79} = \sqrt[3]{64} + \frac{79-64}{3\left[\sqrt[3]{64}\right]^2}$

$= 4 + \frac{15}{3(4)^2}$

$= 4 + \frac{5}{16}$

$= 4 + 0.31$

$= 4.31$ Ans

$$16 \overline{)\,50\,(\,.31} \qquad \begin{array}{r} 48 \\ \hline 20 \\ 16 \end{array}$$

Missing Terms/Number Series

Find the missing number to complete each sum

a. 9+8-5=2x(__)

b. 3x9-14=24-(__)

c. 15÷3x12=41+(__)

d. 24÷4+5=66÷(__)

e. 8x6-13+3=7x6-(__)

$9+8-5=2x(y)$

$17-5=2y \Rightarrow 12=2y$

$y=\frac{12}{2}$

$y=6$

$8X6-13+3=7X6-(\ )$

$48-13+3=42-x$

$48+3-13=42-x$

$51-13=42-x$

$38=42-x$

$x+38=42$

$x=42-38$

$x=4$

Ans: 4

⇒ Number Series

✓ (a) Increasing / Ascending ✓

eg 2, 4, 8, 16, ----

✓ (b) Decreasing / Descending ✓

121, 11, ------

X (c) Mixed ⟶

⇒ (i) pattern

a) Ascending ⇒ $+, \times, x^n$, Mixed

b) Descending = $-, \div, x^{-n}$, Mixed:

(ii) Nature

a) Consecutive

eg 2, 4, 6, 8, 10, 12, (14)

(b) Alternative form:

2, 3, 4, 6, 8, 12, 16, 24, ---, ---

(2) Pairs form:

$\Rightarrow$ (2,4)(3,6),(4,8),(5,10)----

Note: Alternative $\leftrightarrow$ pairs

Find the missing terms in given series

4, 12, 20, ____ 28

+8 +8 +8

20 + 8 = 28

$2^2, 3^2, 4^2, 5^2, 6^2, 7^2, 8^2$

4, 9, 16, 25, 36, ____ 49

+5 +7 +9 +11 +13

\+2 +2 +2 +2

36
13
49 + 15 = 64

8^2

$2^2, 2^3, 2^4, 2^5, (2^6)$ $2^6 = 64$ ✓

4, 8, 16, 32, ____ 64

+4 +8 16 +32

2, 5, 11, 23, 44, ____ 77 ✓ x

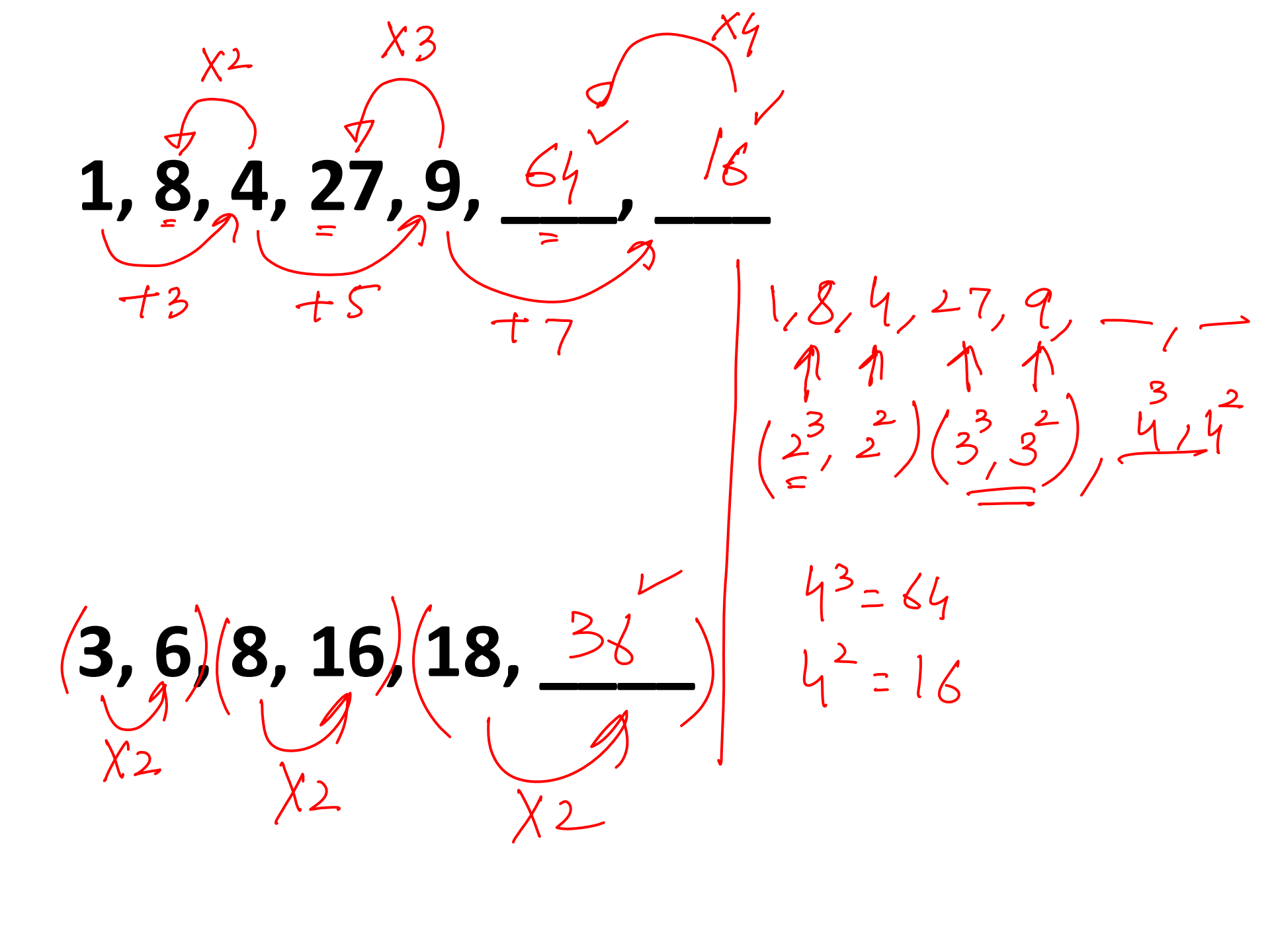
33

+3, +6, 12, 21, (33) ✓✓

3 +3→ 6 +3→ 9 +3→ (12) ✓

21
12
33

3×1 = 3 ✓
3×2 = 6 ✓
3×3 = 9 ✗ (1)
3×4 = 12 ✓
3×5 = 15 ✗
3×6 = 18 ✗ [2]
3×7 = 21 ✓
3×8
3×9
3×10 [3]
3×11 = 33 ✓


1, 8, 4, 27, 9, ____, ____
64
16
+3
+5
+7
1, 8, 4, 27, 9, —, —
(2³, 2²) (3³, 3²), 4³, 4²
4³ = 64
4² = 16
3, 6, 8, 16, 18, ____
38
X2
X2
X2

1, 1/4, 1/13, 1/40, _____

$\Rightarrow \frac{1}{1}, \frac{1}{4}, \frac{1}{13}, \frac{1}{40}, \frac{1}{121}$ ✓

4, 16, 36, 64, _____

$2^2, 4^2, 6^2, 8^2, 10^2$

12 20 28 36 100

+8 +8 +8 +64

100 ✓

1, 4, 13, 40, _____

3 9 27 81

×3 ×3 ×3

40 + 81 = 121

✓

3,5,10,20,37 ____ 63

+2 +5 10 17 26

3 5 7 9

17
9
26+37=63

8,5,13,11,18,17,23,23,28 ____ 29 ✓

+6 +6 +6 +6

+5 +5 +5 +5

(8,5)(13,11),(18,17),(23,23),(28, ___) 29 ✓

−3 −2 −1 0 +1

Ans = 391 ✓

14, 27, 52, 101, 198, _____

H.W

CSS-2021

H.W

a. 1, 8, 27, 64, 125, ____

b. 4, 18, _____, 100, 180, 294

c. 132, 156, ____, 210, 240

d. 8, 24, 12, 36, 18, 54, _____

e. 15, 31, 63, 127, _____

CSS-2024

Find the missing terms

a. 121, 11, 81, 9, ___, 7

b. 100, 50, 25, ___, 6.25

c. 4, 9, 64, 125, 1296, ___

d. 2, 5, 12, 24, 48, ___

e. 44, 22, 66, 33, 132, ___

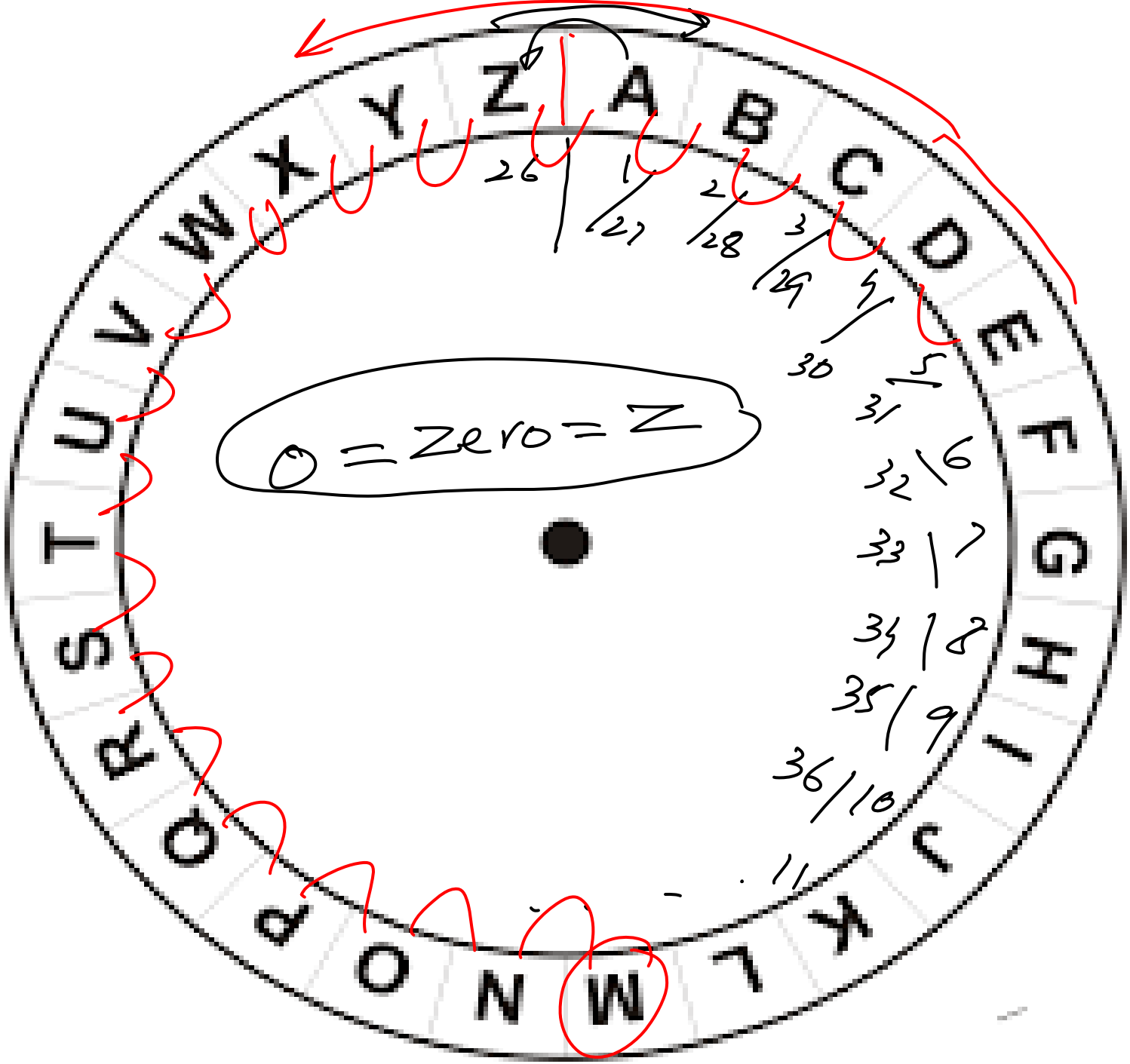
Alphabetical Series
&
Coding/Decoding

Number Substitution Cypher

A	B	C	D	E	F	G	H	I	J
1	2	3	4	5	6	7	8	9	10

K	L	M	N	O	P	Q	R	S	T
11	12	13	14	15	16	17	18	19	20

U	V	W	X	Y	Z
21	22	23	24	25	26


0 = zero = Z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
26 1 2 3 4 5 6 7 8 9 10 11
27 28 29 30 31 32 33 34 35 36

① Ascending / Forward step (+) (X)

(A → Z)(1 → 26)

⇒ Logic :- Alphabet + No. of steps = Result

eg(1)

E + 12 = Q ✓

5 + 12 = 17

eg(2)

P + 10 = Z

16 + 10 = 26

Note:- Result > 26 ⇒ ⇒ Result − 26

eg ①

T + 16

20 + 16 = 36

− 26

10 = T

A − 1 = Z

1 − 1 = 0 = 26 = Z

(2) Descending / Backward steps = −, ÷

(Z → A) / (26 − 1)

Logic Alphabet − No. of steps = Result

eg(1) T − 10 = √

20 − 10 = 10

−ve

+26

(2) X − 12 = L

24 − 12 = 12

⇒ Note ⇒ Result = −ve

+26

eg① E − 18 = M

5 − 18 = −13

+26

13 → M.

Find the missing term in given

1. E, H, L, O, S, _____

5, 8, 12, 15, 19, (22)

+3 +4 +3 +4 +3

19+3=22=✓

2. A, A, B, F, _____

1, 1, 2, 6, (24)

×1 ×2 ×3 ×4

6×4=24=✓

X
C F I L

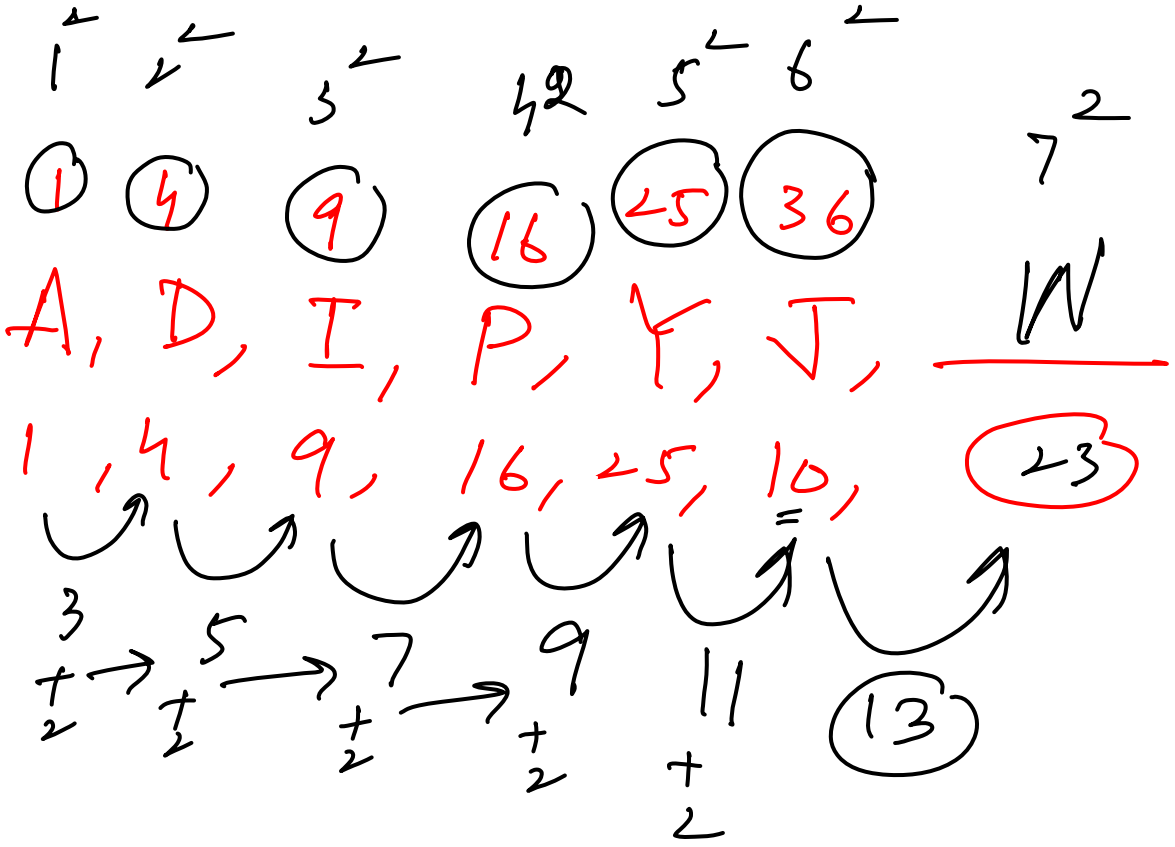
3. AB,DE,GH,JK, MN

4 3 2 1

4. PDZ, QCK, RBX, SAW

16 26 17 25 18 24 19 23

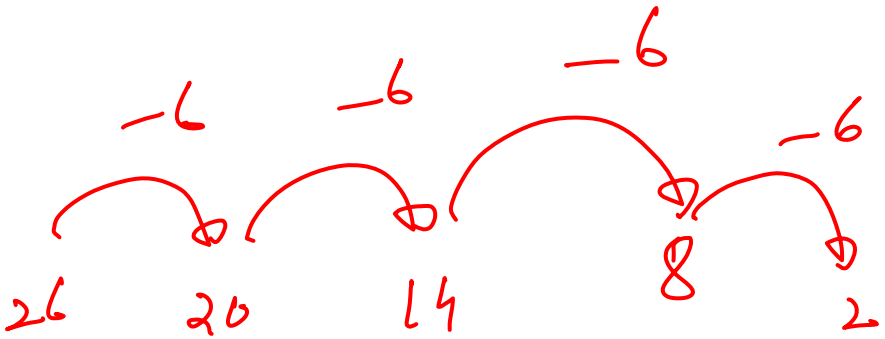
A,D,I,P,Y,J___



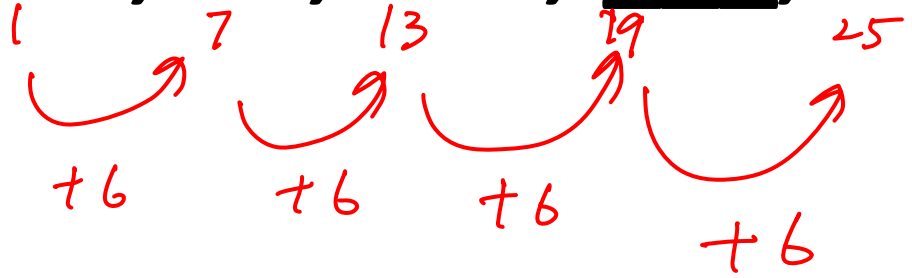
$7^2 = 49$
-26
23

10
+13
23 = W

PMT, OOS, NQR, MSQ, ___



AZ, GT, MN, ___, YB



1. BCB, DED, FGF, HIH, _

2. QPO, NML, KJI, ___, EDC

3. SCD, TEF, UGH, __, WKL

4. QAR, RAS, SAT, TAU, ___

5. JAK, KBL, LCM, MDN, ___

6. ELFA, GLHA, ILJA, ___, MLNA

The word SUPERMAN is written as a code "TTQDSLBM" then the code of SPIDERMAN is?

S U P E R M A N : T T Q D S L B M

S P I D E R M A N :

PAKISTAN: SCLIRRXJ

PESHAWAR:

C E R T A I N: B F Q U Z J M

M U N D A N E:

If in a certain language, *BROTHER* is written as *QDGSNQA*, then in the same language *SISTER* would be written as…? (CSS-2022)

B R O T H E R : *Q D G S N Q A*

S I S T E R :

C O M P U T E R: ***R F U V Q N P C***

M E D I C I N E:

(CSS-2017/19)

Look at this series: *F2,___, D8, C16, B32*. What number should fill the blank? (CSS-2018)

In a certain language *LANDMINE* is written as *PYRBQGRC*. How will *HOMEMADE* be written in that code language? (CSS-2018)

Thank You