CATapult Courseware

Module 1

Practice Exercise Solutions

CATapult Courseware **Module 1**

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Quantitative Ability

QA-Intro | INTRODUCTION TO QA-DI

PRACTICE EXERCISE

1) Give 4 children an apple each, and give the basket (containing the last apple) to the 5th child.

2) A decimal point. (Since 5 < 5.7 < 7)

3) The number of bakers and the number of days have both doubled, hence the number of cakes will increase 2 × 2 = 4 times, hence 20 cakes will be made. Hence (4)

4) The fourth child is Mary herself, naturally! Hence (4)

5) If the original number is abc, the new 6-digit number will be abc x 1002 = abc × 2 × 3 × 167. Hence it will be divisible by 6 (2 × 3) and by 501 (3 × 167) and by 167 itself. But it need not be divisible by 37. Hence (2)

For questions 6-10:

The following table can be made:

Candidate	Round 1	Round 2	Round 3
P	13	16	20
Q	10	-	-
R	12	15	19
S	11	15	21
T	14	14	-

In the first round, 5 distinct numbers, the lowest being 10, add up to 60. The numbers must be Q – 10, S – 11, R – 12, T – 13 and P – 14. In the second round, 4 numbers add up to 60, and the sole lowest is 14 – consequently the numbers must be T – 14, R – 15, S – 15 and P – 16 (note that in round 2 it is not said that the scores are all distinct!). In round 3, S increases by 6 and hence reaches 21. The other two can be shown to have scored as follows: P – 20 and R – 19. The results can be tabulated as follows:

6) T got 14 votes in round 1. Hence (2)

7) P got 16 votes in round 2. Hence (2)

8) S got 15 votes in round 2. Hence (1)

9) R got 19 votes in round 3. Hence (3)

10) S got 47 votes in all across the three rounds. Hence (4)

QA-1.1 | PROPERTIES OF NUMBERS

PRACTICE EXERCISE

1. AVG $\left(\frac{1}{1}+\frac{1}{1}, 1+2, \frac{1}{2}+\frac{1}{2}, 2+3\right)$
= AVG(2, 3, 1, 5)
= $\frac{2+3+1+5}{4} = \frac{11}{4}$. Hence, [2].

Answers to questions 2 to 5:

2. R(b, c) = R(2, 3) = $\frac{2}{3}$
Q(2, $\frac{2}{3}$) = 2 × $\frac{2}{3} = \frac{4}{3}$
P(1, $\frac{4}{3}$) = 1 – $\frac{4}{3} = \frac{-1}{3}$ < 0. Hence, [2].

3. R(c, a) = R(3, 1) = 3
S(a, b) = S(1, 2) = 3
Q(a, c) = Q(1, 3) = 3
P(c, a) = P(3, 1) = 2
Q(3, 3) = 9; S(3, 2) = 5
Now, P(9, 5) = 4. Hence, [3].

4. S(x, y) = x + y; P(x, y) = x – y
Q(x + y, x – y) = (x + y) (x – y) = $x^2 – y^2$
Q(3, x + y) = 3(x + y)
∴ P(3x + 3y, x + y) = 3x + 3y – x – y
= 2(x + y)
R($x^2 – y^2$, 2(x + y)) = $\frac{x^2-y^2}{2(x+y)} = \frac{x-y}{2}$. Hence, [4].

5. I. S(x – y, x – y) = 2(x – y)
II. Q(x + y, $\frac{x}{y}$) = (x + y) $\left(\frac{x}{y}\right)$ = x + $\frac{x^2}{y}$
III. P(x + y, xy) = x + y – xy
But, which one is the greatest can be found out only if x and y are known. Hence, [4].

6. 1st digit being an even prime number, is 2. Hence option 1] is ruled out.
The next digit is square value of 1234. So it should end in 6. Hence, [4].
Alternatively,
1st digit is 2 & next part = $(1234)^2$ = 1522756
Hence the number is 21522756.

7. $0.\overline{35} + 0.\overline{63} \times 100 \div 0.\overline{4} – 0.3\overline{4}$
= $\frac{35}{99} + \frac{63}{99} \times 100 \div \frac{4}{9} – (0.3 + 0.0\overline{4})$
= $\frac{35}{99} + \frac{63}{99} \times 100 \div \frac{4}{9} – \left(\frac{3}{10}+\frac{4}{90}\right)$
= $\left(\frac{35}{99}+\frac{63}{99}\right) \times 100 \div \frac{4}{9} – \frac{31}{90}$
= $\frac{98}{99} \times 100 \div \left(\frac{4}{9}-\frac{31}{90}\right)$
= $\frac{98}{99} \times 100 \div \left(\frac{9}{90}\right)$
= $\frac{98}{99} \times (100 \div 0.1)$
= $\frac{98}{99} \times 1000 = 0.\overline{98} \times 1000 = 989.\overline{89}$
Hence, [3].
Alternatively,
$0.\overline{35} + 0.\overline{63} \times 100 \div 0.\overline{4} – 0.3\overline{4}$
= $(0.\overline{35} + 0.\overline{63}) \times 100 \div 0.\overline{4} – 0.3\overline{4}$
= $0.\overline{98} \times 100 \div (0.\overline{4} – 0.3\overline{4})$
= $0.\overline{98} \times (100 \div 0.1)$
$\left[0.0\overline{4} – 0.3\overline{4} = 0.444... – 0.344... = 0.100...\right]$
= $0.\overline{98} \times 1000 = 989.\overline{89}$. Hence, [3].

8. If Anil has to give 1 rupee he needs a bag with Re.1. For 2 rupees he had two bags with Re.1 each or Rs.2 bag. To have minimum bags he has a bag with Rs.2. Now with the two bags he can give Rs.3. So next he will require a bag with Rs.4. With these three he can give Rs.5, Rs.6 and Rs.7 and next bag will be one containing Rs.8 and so on. Thus he would have bags with Re.1, 2, 4, 8, 16, 32. Sum of which is 63 and remaining 37 can be put in the last bag. So total number of bags is 7. Hence, [3].

9. A = $0.a_1a_1a_1...$ ∴ 10A = $a_1.a_1a_1...$
⇒ 9A = a_1 ⇒ A = $\frac{a_1}{9}$.
Similarly, B = $\frac{a_2}{9}$.
Now, 'a_1' and 'a_2' are multiples of 3 and are distinct. Also, these values are less than 8.
either a_1 = 3 and a_2 = 6 or a_1 = 6 and a_2 = 3
∴ $a_1 + a_2 = 9$.
∴ A + B = $\frac{a_1}{9}+\frac{a_2}{9} = \frac{a_1+a_2}{9} = \frac{9}{9}$ = 1. Hence, [3].

10. The number of digits written by Sachin can be divided into one digit, two-digit and three-digit numbers.

	Numbers written	Number of digits written
One digit	1 to 9	9
two-digit	10 to 99	180
three-digit	100 to 999	2700

Thus, from 1 to 999 he has written 2889 digits.
Now, last three numbers till 999 are 997, 998, 999.
Thus, 2883rd digit will be 7. Hence, [3].

11. Using the given options:
(i) 72 × 3.23 = 232.56
(ii) 72 × 5.11 = 367.92
(iii) 72 × 5.51 = 396.72
(iv) 72 × 7.22 = 519.84
Thus, it can be seen that only option 3 is possible.
Hence, [3].
Note: The best way to solve this question is to multiply the alternatives by 72 and find which one gives you the middle three digits 96.7. To cut time, you can choose to multiply 72 by integer values only, e.g. 72 × 3 = 216, 72 × 5 = 360 and 72 × 7 = 504. It must be remembered that the decimal part of the answer will be multiplied by 72 and the actual answer will increase.
Let us now roughly multiply the decimal values of the options also by 72, e.g. 72 × 0.2 = 14.4, 72 × 0.1 = 7.2 and 72 × 0.5 = 36. So option (1) will yield (216 + 14) = 230 (approximately), (2) will yield (360 + 7) = 367 (approximately), (3) will yield (360 + 36) = 396 (approximately) and (4) will yield (504 + 14) = 528 (approximately). Of these only option (3) satisfies our requirement of 2nd and 3rd digits being 96. Hence, [3].

12. Let the number to be multiplied be x.
Then we can say 53x – 35x = 540.
Solving, we get x = 30.
Therefore the product obtained should have been = 30 × 53 = 1590. Hence, [4].

13. As 2 and 5 are prime numbers, there multiplication will give the only possible zero. Hence, [1].

14. The possible squares >300 are 324, 361, 400, 441, 484, 529,576, 625, 676, 729, 784, 841, 900 and 961.
Out of these values, only 441 matches the type ccb and also the square of 21 = 441. Therefore, b = 1
Hence, [1].

15. Option 1: (x – 1)yz = xyz – yz
Option 2: x(y – 1)z = xyz – xz
Option 3: xy(z –1) = xyz – xy
Option 4: x(y + 1)z = xyz + xz
x > y > z ∴ yz < xz < xy
∴ xyz – yz is closest to xyz. Hence, [1].

16. Statement I suggests that xyz is odd. This is only possible if all three of them are odd. Hence, z – x is even.
Statement II states that xy + yz + xz is even.
For this we consider 2 possible scenarios.
Case I: exactly 2 of xy, yz and xz is odd and the other is even.
Let us suppose that xy and xz are both odd.
If xy is odd both x and y are odd.
If xz is odd both x and z are odd.
This means that each of x, y and z are odd.
So case I is not possible.
Case II: each of xy, yz and xz is even.
In this case at least 2 of x, y and z has to be even.
If exactly 2 of x, y and z are even, then each of xy, yz and xz will be even. However, we can have 2 subcases in case II where either exactly 1 amongst x and z is even and the other is odd or both x and z are even.
So then the difference between x and z can be either odd or even.
So statement II alone is not sufficient to answer the question.
Since the question can be answered by using statement I alone we mark option (1) as the correct answer. Hence, [1].

17. This can be answered using both the statements.
Statement II suggests that both t and z are odd.
Statement I suggests that if (x + y + t) is even. Since the difference between an even and an odd number is always odd, (x + y + t) – z will be odd.
Hence, [3].

18. Depending on the whether y is greater or equal to 0.5, either x or y would be the median. In either case, median lies between 0 and 1.
Hence, [2].

19. As x, y and z are odd numbers, any power of these numbers will be odd.
Option (1): $x^2y^2z^2$ = odd × odd × odd = odd → Always true
Option (2): $3(x^2 + y^3)z^2$ = 3(odd + odd) × odd = 3 × even × odd = even → Always true
Option (3): $5x + y + z^4$ = odd + odd + odd = odd → Always true
Option (4): $z^2(x^4 + y^4)/2$ = odd(odd + odd)/2
= odd × odd = odd → Always true.
Hence, [4].

20. Let us evaluate each option : 2) 0 < y < 1 and z > 1 so yz > 0.
Option 3) Since both x & y are not equal to 0, xy will never be 0.
Option 4) y is a positive number < 1 and z is a positive number > 1, therefore $(y^2 – z^2)$ is always negative.
Option 1) If |x| > |z|; $x^2 – z^2 > 0$
If |x| = |z|; $x^2 – z^2 = 0$
If |x| < |z|; $x^2 – z^2 < 0$
So Option 1 may or may not be true.
Hence, [1].

QA-1.2 | DIVISIBILITY AND GCD-LCM

PRACTICE EXERCISE 1

1. Let the two numbers be 65a and 65b. (a and b are co-prime numbers)
Sum of the two numbers = 65a + 65b = 1560
$\Rightarrow$ 65 (a + b) = 1560
$\Rightarrow$ a + b = 24
The possible pairs of a and b will be (1, 23), (5, 19), (7, 17) and (11, 13)
4 pairs are possible.

2. HCF (259, 333, 481, 555) = 37 kg
Therefore, the required answer is 37 kg.

3. The factors of a^2 are 1, a and a^2. The factors of ab are 1, a, b and ab. The factors of a^3 are 1, a, a^2 and a^3. Hence, [3].

4. Let S_1 = 17, 21, 25, ... 417
and S_2 = 16, 21, 26, ... 466
So, terms of S_1 are in the form 4n + 1 ($4 \le n \le 104$)
and terms of S_2 are in the form 5m + 1 ($3 \le m \le 93$)
In order to have same terms, we should get 4n = 5m.
This happens only 20 times.
Thus, we get 21, 41, 61, ... 401 i.e., 20 common terms. Hence, [3].

5. Consider n = 8
Number of factors of 8 = 2^3 are k = 4
$\therefore k \ge \frac{n}{2}$.
Similarly, the numbers 1, 2, 3, 4, 6, 8 and 12 satisfy the given condition. Hence, [1].

6. We need to use coins of maximum denominations for minimum number of coins.
$\therefore$ 36 paise = 25 + 5 + 2 + 2 + 2 $\rightarrow$ 5 coins
77 paise = 50 + 25 + 2 $\rightarrow$ 3 coins
Rs.2.03 rupees = 50 + 50 + 50 + 25 + 10 + 10 + 2 + 2 + 2 + 2 $\rightarrow$ 10 coins.
Total number of coins = 5 + 3 + 10 = 18.
Hence, [3].

7. The LCM of 135, 72, and 120 is 1080 seconds = 18 minutes.
This means all lights will flash simultaneously after 18 minutes. But in this 18 minutes the clock will lose 2 × 18 = 36 seconds. Therefore clock will show 36 seconds less than the correct time.
Hence 8 : 17 : 24. Hence, [4].

8. From 1 to 9 there are 3 numbers divisible by 3.
From 10 to 99, there are 30 numbers divisible by 3.
Thus, there are 30 × 2 + 3 = 63 digits till 99.
To get 100^{th} digit, we need to get the 37^{th} digit after the 2^{nd} 9 of 99.
Note: 37 = 12 × 3 + 1. Hence we need the 1^{st} digit of the 13^{th} number, divisible by 3, after 99. The number is 138.
$\therefore$ The 100^{th} digit of given number is 1.
Hence, [1].

9. Sum of digits of 198a is 18 + a, so for a = 3 or 9 the number will be divisible by 3. If a = 1, 1981 is divisible by 7. Hence, [3].

10. As we have to use the minimum number of marble tiles, the size of the tiles should be the maximum possible size. It should be the highest common factor of 2 m 56 cm and 3m 36 cm.
2 m 56 cm = 256 cm and
3 m 36 cm = 336 cm.
256 = 16 × 16
336 = 16 × 21
The HCF of 256 and 336 = 16
Hence, the side of the square is 16 cm.
The number of such square marble tiles required = $\frac{256 \times 336}{16 \times 16}$ = 336 marble tiles. Hence, [2].

Answers to questions 11 and 12:

11. H.C.F. of the individual number of diamonds is 13.

	39	52	26
Step I	39	39	39

Hence, [1].

12. H.C.F. of the individual number of diamonds is 17. So they have 17(3 + 5 + 6) = 17 × 14 = 238 diamonds. 238 is not a multiple of 3. So it is not possible to distribute them evenly. Hence, [4].

13. To divide according to the condition, the share each one will get
$= \text{HCF}\left(4\frac{1}{2}, 3\frac{1}{4}, 6\frac{1}{3}\right) = \text{HCF}\left(\frac{9}{2}, \frac{13}{4}, \frac{19}{3}\right)$
$= \frac{1}{12}$
i.e., each guest will get $\frac{1}{12}$ litres.
Total number of guests
$= \frac{\frac{9}{2}}{\frac{1}{12}} + \frac{\frac{13}{4}}{\frac{1}{12}} + \frac{\frac{19}{3}}{\frac{1}{12}}$ = 54 + 39 + 76 = 169.
Hence, [3].

14. Given HCF = 3 × 5 and LCM = 2 × 3 × 5 × 7.
∴ If a and b are the two numbers,
ab = 2 × $(3 \times 5)^2$ × 7
Also a = (3 × 5) × k and b = (3 × 5) × m, where k and m are non-zero non-unit integers.
Then a = 2 × 3 × 5 = 30 and
b = 3 × 5 × 7 = 105. Hence, [2].
Alternatively,
15 is HCF, so, 15 should divide both the numbers in the pair. Only in option [2], 30 and 105 both are divisible by 15.

15. Gifts were equally divided among 10 & 6 students.
∴ Least number of gifts is the LCM of 10 and 6, i.e., 30. Hence, [2].

16. Let the HCF of x and y be g.
So, HCF of y and x – y is also g.
Also product of 2 numbers = HCF × LCM.
∴ (xy) – [y(x – y)] = g × 18
∴ $y^2 = 18g = 3^2 \times 2g$
∴ 3 and 2 must be factors of y.
∴ y cannot be 16, 27 or 4.
Hence, [2].
Alternatively,
Let, LCM of x and y is p
Let, LCM of y and (x – y) is q
⇒ y is a factor of p & q.
|p – q| = 18
∴ y divides p and q, y divides 18. The only such option is 18.

17. Solution: Any number, which when divided by 6, 15 and 17 leaves a remainder of 1, is of the form {k × LCM(6, 15, 17) + 1}, where = 1, 2, 3... and so on.
k × LCM(6, 15, 17) + 1 = 510k + 1
It is given that (510k + 1) is a multiple of 7.
When k = 1, we get 511, which is a multiple of 7.
Hence, [2].

18. If (k + 4) is divisible by 7, then = 3, 10, 17, 24, ...
It is given that k + 2n is divisible by 7.
If = 3, then the value of n, which is greater than 2 such that (3 + 2n) is a multiple of 7 is 9.
Hence, [1].

19. Since the number (n) is divisible by both 2 and 3, it must be divisible by 6. Let the number be of the form 6k. Also, (2n+1) is divisible by 5 i.e. [2(6k) + 1] → 12k+1 is divisible by 5. For 12k+ 1 to be divisible by 5, 12k must end in a 4 or a 9. But 12k can never end in a 9. Thus, 12k ends in a 4.
The values 12k can take are 24, 84, 144, 204....
Thus k can be 2, 7, 12, 17, 22, 27 ....
6k can be 12, 42, 72, 102, 132, 162 and 192. (As 6k < 200)
And $\frac{12k+1}{5}$ can take values 5, 17, 29, 41, 53, 65 and 77.
As $\frac{12k+1}{5}$ is a composite number, only 65 and 77 are the possible values.
Hence, 162 and 192 are the only 2 numbers that satisfy the given conditions.
Hence, [3].

20. Let HCF be h and LCM be ℓ.
I. Let the numbers be ah and bh.
Then abh = ℓ and (a + b)h = m
or (a – b)h = n
Using these ah and bh can be uniquely determined. Thus, I is true.
II. If HCF = LCM then the two numbers are equal and same as HCF or LCM.
Thus, II is true.
III. $\frac{LCM}{HCF}$ = a prime i.e., $\frac{\ell}{h}$ = P.
Then one of the numbers is equal to h and other is equal to ℓ. Thus, III is true.
Hence, [4].

PRACTICE EXERCISE 2

1. Let us choose any prime number greater than 6 and check. When 7 is divided by 6, remainder = 1. When 11 is divided by 6, remainder = 5.
Hence, [2].

2. The bells will chime together after a time that is equal to the LCM of 18, 24 and 32 = 288 min = 4 hr and 48 min. Hence, [2].

3. We can use options to solve this problem. In option (4), 84 + 53 = 137. This when divided by 3, 4 & 7 leaves remainders as 2, 1 & 4 respectively. No other option satisfies this. Hence [4].

4. Red light flashes once in every $\frac{1}{3}$ of a minute
Green light flashes once in every $\frac{2}{5}$ of a minute
Taking LCM of both the figures, we can find the time required by both to flash together = LCM of $\frac{1}{3}$ and $\frac{2}{5}$ = 2.
Therefore, they both flash once every two minutes. Hence in 1 hour, they will flash $\frac{60}{2}$ = 30 times.
Hence, [1].

5. The difference of these two numbers will be completely divisible by 'n'. Therefore, 1535 is divisible by n, and hence, option 4 is correct as 307 × 5 = 1535.
Hence, [4].

6. Elements of set A would have the property of being 1 less than the common multiple of the given divisors (2, 3, 4, 5 and 6).
Thus, every element of set A is of the form 60k – 1
Between 0 and 100, only 59 satisfies the above condition.
Hence, [2].

7. The L.H.S. is an addition of 'n' terms. Each of the terms is a product of 4 numbers.
Each of the 4 numbers is either equal to 1 or –1. The product of these 4 numbers will be 1 or –1 (depending upon the count of 1 & –1)
Eg. $1 \times 1 \times 1 \times 1 = 1$, $1 \times (-1) \times (-1) \times 1 = 1$,
$1 \times 1 \times 1 \times (-1) = -1$, $1 \times (-1) \times (-1) \times (-1) = -1$.
The sum of all the terms is 0. It is possible when an equal number of 1's & –1's are added.
Eg $1 + (-1) + (-1) + 1 = 0$, $1 + 1 + (-1) + (-1) + 1 \neq 0$
Thus, total number of terms must be a multiple of 2 i.e. even. Hence [1].

8. The time taken by the white spots on all three wheels to simultaneously touch the ground again will be equal to the LCM of the times taken by the three wheels to complete one revolution.
The 1st wheel completes 60 revolutions per minute. This means that to complete one revolution, it takes
$\frac{60}{60}$ = 1 second.
The 2nd wheel completes 36 revolutions per minute. This means that to complete 1 revolution, it takes
$\frac{36}{60}$ = 0.6 seconds
Similarly, the 3rd wheel takes $\frac{24}{60}$ = 0.4 seconds.
Therefore, LCM of 1, $\frac{3}{5}$, $\frac{2}{5}$ will be $\frac{6}{1}$ = 6 seconds
Hence, [3].

9. Since 899 is divisible by 29, so you can directly divide the remainder of 63 by 29, therefore, giving 5 as the remainder. Hence, [1].

10. HCF of 60, 84 and 108 is 12. Hence, 12 students should be seated in each room. So for subject A, $\frac{60}{12}$ = 5 rooms.
For subject B, we would require $\frac{84}{12}$ = 7 rooms
For subject C, we would require $\frac{108}{12}$ = 9 rooms
Therefore, minimum number of rooms to satisfy our condition = 5 + 7 + 9 = 21 rooms.
Hence, [4].

11. The number formed by the last 3 digits of the main number is 354. The remainder is 2 if we divide 354 by 8. So, the remainder of the given number is also 2 if we divide it by 8. Hence, [3].

12. $\left(\frac{16n^2 + 7n + 6}{n}\right)$ is an integer when $\left(\frac{6}{n}\right)$ is an integer.
This is possible when n = ±1, ±2, ±3 or ±6. Thus, the number of values for n = 8. Hence, [4].

13. If we were to express 64 as product of two positive integers, we can get the following combinations: (64 × 1), (32 × 2), (16 × 4), (8 × 8).
Thus, we find that P + Q cannot be 35.
Hence, [4].

14. Let m = 5a and n = 5b
(a & b are integers)
Option (1): m – n = 5a – 5b
= 5(a – b) → Always divisible by 5
Option (2): $m^2 - n^2 = (5a)^2 - (5b)^2 = 25(a^2 - b^2)$ → Always divisible by 25
Option (3): m + n = 5a + 5b = 5(a + b) → May or may not be divisible by 10.
Hence, [3].

15. $n(n^2 - 1) = (n - 1)n(n + 1)$. If you observe, this is the product of three consecutive integers with middle one being an odd integer. Since there are two consecutive even numbers, one of them will be a multiple of 4 and the other one will be multiple of 2. Hence, the product will be a multiple of 8. Also since they are three consecutive integers, one of them will definitely be a multiple of 3.
Hence, this product will always be divisible by (3 × 8) = 24.
Hence, [3].

16. Solution: Given: N = 774958A96B
For a number to be divisible by 8, the last 3 digits have to be divisible by 8. Here, 96B should be a multiple of 8. The set of values that satisfies this condition are 960 and 968 ∴ B = 0 or 8
For a number to be divisible by 9, the sum of all the digits has to be divisible by 9. Here, (7 + 7 + 4 + 9 + 5 + 8 + A + 9 + 6 + B) = (55 + A + B) should be a multiple of 9.
If B = 0, then (55 + A) should be a multiple of 9, thus A should be 8.
If B = 8, then (63 + A) should be a multiple of 9, thus A should be 0.
Hence, [2].

17. As n(n + 1) forms two consecutive integers, one of them will be even and hence the product will always be even. Also, the sum of the squares of first n natural numbers is given by n(n + 1) (2n + 1)/6. Hence, the product will always be divisible by this.
Also, we can verify that the product is always divisible by 3. However, we can find that the option (4) is not necessarily true. Only under certain situation does it hold good. e.g. if n = 130, (2n + 1) = 261
Hence, [4].

18. The LCM of 7, 12 and 16 is 336. The nearest multiple of 336 to 1856 is 1680. So 1684, when divided by 7, 12 and 16, leaves a remainder of 4. This is the closest such number to 1856. Hence, the number to be subtracted from 1856 to get 1684, must be the least such number. So, the answer is (1856 – 1684) = 172.
Hence, [4].

19. From statement I, we get to know that if the number-indicating the class strength is divisible by 8 adding 12, then it will also be divisible by adding 4.
So statement I alone is sufficient to answer the question.
Statement II only tells us that the number of students is not divisible 8.
So using statement II alone we cannot answer the question.
Hence, [1].

20. Using statement I alone, possible values of x are 4, 12 and 36.
So using statement I alone, we do not get a unique value of x.
Using statement II alone, possible values of x are 4, 8, 10, 14 ..... and so on.
So using statement II alone, we do not get a unique value of x.
Using both statements together, we know that the product of 2 numbers = LCM × HCF = 36 × 2 = 72. So, $x = \frac{72}{18} = 4$.
Hence, both the statements are required to answer the question.
Hence, [3].

QA-1.3 | INDICES AND SURDS

PRACTICE EXERCISE

1. Solve:

a) 100

b) $2^{11} = 2048$

c) 0.64. $2^2 \times 2^2 \times 2^2 \times 2^2 \div (2^2 \times 10^2)$

$= 2^6 \div 100 = 0.64$

d) $\frac{3}{4} \cdot \left(\frac{27}{64}\right)^{\frac{1}{3}} = 27^{1/3} \div 64^{1/3} = 3/4$

e) 2^{36}

f) $2^7 = 128.$

$\sqrt{2^8 \times 2^{12} \div 2^6} = \sqrt{2^{8+12-6}} = \sqrt{2^{14}} = 2^7$

g) x = 4/3

h) t = –1

2. a) $3^3 = 27$

b) n = 9

c) 1/8

d) 400000000. $4^5 \times 25^2 \times 25^2 = 4^5$
$= 4 \times 100^4 = 400000000$

e) 54. $2^4 \times 3^6 \div 2^3 \div 3^3 = 2 \times 3^3 = 54$

f) $\frac{9}{32}$

g) 1

h) 0.5

3. Simplify:

a) $7\sqrt{2} - 5\sqrt[3]{2} + 3\sqrt{6}$

$2\sqrt{2} - 3\sqrt[3]{6} - 2\sqrt[3]{2} + 5\sqrt{2} = 7\sqrt{2} - 5\sqrt[3]{2} + 3\sqrt{6}$

b) $\frac{4\sqrt{3}}{27}$

$\frac{\sqrt{3}}{9} + \frac{\sqrt{3}}{27} = \frac{4\sqrt{3}}{27}$

c) $\frac{4\sqrt[3]{9}}{9}$

$\frac{1}{3\sqrt[3]{3}} + \frac{2}{2\sqrt[3]{3}} = \frac{1}{\sqrt[3]{3}}\left(\frac{4}{3}\right) = \frac{1 \times \sqrt[3]{9}}{\sqrt[3]{3} \times \sqrt[3]{9}}\left(\frac{4}{3}\right) = \frac{4\sqrt[3]{9}}{9}$

d) 4/27

$\frac{\sqrt[6]{2^2}}{\sqrt[6]{3^3}} = \sqrt[6]{\frac{4}{27}} = 4/27$

e) 10

$\frac{\sqrt[3]{40}}{\sqrt[2]{2}} \times \sqrt[2]{2} \times \sqrt[3]{25} = \sqrt[3]{40 \times 25} = \sqrt[3]{8 \times 5 \times 25}$

$= 2 \times 5 = 10$

f) x = 16

$\sqrt[6]{4} = \sqrt[12]{16}$

g) $\frac{4\sqrt{7} - 4\sqrt{2}}{25}$

$\frac{1(\sqrt{7} - \sqrt{2})}{(\sqrt{2} - \sqrt{7}) \times (\sqrt{7} - \sqrt{2})} + \frac{\sqrt{2} - \sqrt{7}}{25} = \frac{5(\sqrt{7} - \sqrt{2})}{25} + \frac{\sqrt{2} - \sqrt{7}}{25} = \frac{4\sqrt{7} - 4\sqrt{2}}{25}$

$\frac{1(\sqrt{7} - \sqrt{2})}{(\sqrt{2} - \sqrt{7}) \times (\sqrt{7} - \sqrt{2})} + \frac{\sqrt{2} - \sqrt{7}}{25} = \frac{5(\sqrt{7} - \sqrt{2})}{25} + \frac{\sqrt{2} - \sqrt{7}}{25} = \frac{4\sqrt{7} - 4\sqrt{2}}{25}$

4. Find the positive square root of:

a) $2 + \sqrt{6}$

b) $2\sqrt{2} + \sqrt{3}$

c) $1 + 2\sqrt{6}$

5. $(1.2)^4$ is greater

6. $(x^8)^{11} < y^{11}$
$\therefore x^8 < y \qquad \therefore 256 < y.$
Hence, [1].

7. Let the number of trees be n

$\therefore n^2 = 5625 \quad \therefore n = \sqrt{5625} = 75$ Hence, [3].

8. $\sqrt{14\frac{21}{44} \times 2\frac{7}{55} \times \frac{9}{20}} = \sqrt{\frac{637}{44} \times \frac{117}{55} \times \frac{9}{20}}$

$= \sqrt{\frac{670761}{48400}} = \frac{819}{220} = 3\frac{159}{220}$. Hence, [2].

9. $(-2)^{-1/3}$ is the only negative option.

$(2)^{-3/2} = \frac{1}{\sqrt{8}}$ and $(3)^{-1/2} = \frac{1}{\sqrt{3}}$

$\therefore (3)^{-1/2} > (2)^{-3/2}$

$\left(\frac{3}{2}\right)^{\frac{-2}{3}} = \left(\frac{2}{3}\right)^{\frac{2}{3}} = \left(\frac{4}{9}\right)^{\frac{1}{3}} = \left(\frac{16}{81}\right)^{\frac{1}{6}}$

$(3)^{-1/2} = \left(\frac{1}{3}\right)^{\frac{1}{2}} = \left(\frac{1}{27}\right)^{\frac{1}{6}}$

$\therefore \left(\frac{3}{2}\right)^{\frac{-2}{3}} > 3^{-1/2}$. Hence, [3].

10. $\frac{2^5 \times 2^{4x} - 2^6 \times 2^{4x-2}}{2^3 \times 2^{4x}} - \frac{2^x \times 2^2}{2^{x+1} - 2^x}$

$= (2^2 - 2^1) - \frac{2^2}{2 \quad 1}$

$= 2 - 4 = -2$
Hence, [2].
Alternatively,
Suppose x = 0

we have $\frac{2^5 - \frac{64}{2^2}}{8} - \frac{4}{2-1}$

$= \frac{32-16}{8} - 4 = 2 - 4 = -2.$

11. $a = 2^{56} \times 3^{36} \times 11^{44}$
$= 2^2(2^{54} \times 3^{36} \times 11^{44})$
$b = 2^{54} \times 3^{37} \times 11^{45}$
$= 3 \times 11(2^{54} \times 3^{36} \times 11^{44})$
$c = 2^{58} \times 3^{38} \times 11^{44}$
$= 2^4 \times 3^2(2^{54} \times 3^{36} \times 11^{44})$
$d = 2^{57} \times 3^{36} \times 11^{45}$
$= 2^3 \times 11(2^{54} \times 3^{36} \times 11^{44})$
$\therefore c > d > b > a$. Hence, [2].

12. 1] $\sqrt{27} + \sqrt{147}$

$= 3\sqrt{3} + 7\sqrt{3} = 10\sqrt{3} \rightarrow$ not an integer

2] $\sqrt[3]{-8} + \sqrt{36}$

$= (-2) + 6 = 4 \rightarrow$ integer

3] $\sqrt[3]{8} + \sqrt{-36}$

$= 2 + 6\sqrt{-1} = 2 + 6i$, which is not an integer

Hence, [2].

13. The given expression is

$\frac{8^{2/3} + \left(\frac{1}{4}\right)^{-3/2} + \left(\frac{1}{27}\right)^{-4/3}}{(12^2)^{1/2}} = 2^{3 \times \frac{2}{3}} + (2^2)^{\frac{3}{2}} + (3^3)^{\frac{4}{3}}$

$= \frac{4+8+81}{12} = \frac{93}{12} \Rightarrow$ improper fraction.

Hence, [2].

14. Put a = 5 $\therefore$ b = 4

$\therefore \sqrt{a} = \sqrt{5}$ lies between 2 to 3

$\therefore [\sqrt{a}] = 2$

$\therefore \frac{[\sqrt{a}]^{\sqrt{b}}}{\sqrt{b}} = \frac{2^2}{2} = 2$

Substitute in options, only option [3] gives 2.
Hence, [3].

15. $\frac{4 \times 4^{3n} + 4 \times 4^{3n-3}}{6 \times 4^{2n} - 6^n} = \frac{256}{3}$

$\therefore \frac{4^3 \times 4^{3n} + 4 \times 4^{3n+3}}{4^2 \times 4^{2n} - 4^{2n}} = \frac{256}{3}$

$\therefore \frac{4^{3n+3} \times 4^{3n+4}}{4^{2n+2} - 4^{2n}} = \frac{256}{3}$

$\therefore \frac{4^{3n+3}(1+4)}{4^{2n}(16-1)} = \frac{256}{3}$

$\therefore 4^{n+3} = 256$
$\therefore 4^n \times 64 = 256$
$\therefore n = 1$
Hence, [2].

16. We make all the powers equal.

$2^{\frac{1}{2}} = (2^6)^{\frac{1}{12}} = (64)^{\frac{1}{12}}$

$3^{\frac{1}{3}} = (3^4)^{\frac{1}{12}} = (81)^{\frac{1}{12}}$

$4^{\frac{1}{4}} = (4^3)^{\frac{1}{12}} = (64)^{\frac{1}{12}}$

$6^{\frac{1}{6}} = (6^2)^{\frac{1}{12}} = (36)^{\frac{1}{12}}$

Comparing bases, $(81)^{\frac{1}{12}} = 3^{\frac{1}{3}}$ is the largest.
Hence, [2].

17. At each stage, displayed entry can be thought of as a pair of x. Each reciprocation reverses sign of exponent of x. Each squaring doubles the exponent.
Thus each pair of squaring : reciprocal multiplies the exp by –2.

$\therefore$ Final exponent = $(-2)^n \Rightarrow y = x^{(-2)^n}$.
Hence, [3].

18. 1] As n^3 is odd, it implies that 'n' will be odd as cube of an odd number has to be odd and cube of an even number has to be even. Therefore, Statement 1 is true.
2] As 'n' is odd, n^2 will also be odd.
Therefore, Statement 2 is also true.
Hence, [3].

19. $5^a = 26 \Rightarrow (5^a)^2 = 676$

$\Rightarrow 5^{2a} = 676$ ... (I)
Also given, $125^b = 676$
$\Rightarrow (5^3)^b = 676 \Rightarrow 5^{3b} = 676$ .... (II)
Equating (I) and (II) we get
$5^{2a} = 5^{3b}$
As bases on the L.H.S and R.H.S are equal, the powers have to be equal.

$\therefore 2a = 3b$

Hence, [3].

20. $a^{44} < b^{11}$
$a = 2$
$\therefore 2^{44} < b^{11}$
This is only possible when $b > 2^4$
Thus, answer can be obtained using statement B only.
Statement A does not give relevant information to obtain accurate answer. Hence, [1].

QA-1.4 | LINEAR AND QUADRATIC EQUATIONS

PRACTICE EXERCISE

1. If $x < y$, $y - x/2 = 3(x - x/2)$.
$\therefore \frac{x}{y} = \frac{2}{1}$. Hence, [1].

2. In this case, since x, y and z are distinct positive integers, our aim is to figure out which of the answer choices cannot be expressed as the sum of 3 integers uniquely. For eg. 6 can only be expressed as (1+2+3). 7 can only be expressed as (1+2+4). But 8 can be expressed as either (1, 2, 5) or (1, 3, 4). Hence, [4].

3. Let the three numbers be a, b, c, such that a is the largest and c is the smallest.
Now $\frac{a - c + b}{3} = \frac{a + b + c}{3} - 14$
$\therefore a - c + b = a + b + c - 42$
$\therefore c = 21$. Hence, [3].

4. Let the number of boys be x and the number of girls be y
$\therefore x + y = 100$ ..... (i)
Number of boys who failed in Maths = $\frac{1}{3}x$
$\therefore$ Number of boys who passed in maths = $x - \frac{1}{3}x = \frac{2}{3}x$
Similarly, number of girls who passed in English $= y - \frac{2}{5}y = \frac{3}{5}y$
$\therefore \frac{2}{3}x + \frac{3}{5}y = 64$
$\therefore 10x + 9y = 960$ ..... (ii)
Multiplying equation (i) by 9 and subtracting from (ii)
$x = 60$. Hence, [3].

5. If x and y are the two unequal parts, then
$x^2 - y^2 = 27(x - y)$
$\Rightarrow x + y = 27$ ($\because x \neq y$). Hence, [3].

6. Let x be the number not cast for Praja Party in the previous polls. So the number of votes not cast for the party in this assembly polls would be 1.25x. This means that the number of votes cast for the party in the two polls would be (260000 – x) and (260000 – 1.25x) respectively.
Margin of victory in the previous polls = (votes cast) – (votes not cast) = (260000 – x) – x = (260000 – 2x).
Margin of loss in this year's polls = (votes not cast) – (votes cast) = 1.25x – (260000 – 1.25x) = (2.5x – 260000).
Now, it is said that (Margin of loss this year) = 2 x (Margin of victory last year).
Therefore, (2.5x – 260000) = 2(260000 – 2x).
Solving this equation we get, x = 120000.
This means that 120000 votes were not cast for theparty in the previous assembly polls.
Therefore, the number of votes cast for the party = 260,000-120,000 = 140,000. Hence, [3].

7. The worst scenario is when the other four get an equal and the winner gets more votes than each of number of votes. Let the winning candidate get x votes.
$\therefore x > \frac{261 - x}{4}$
$\therefore x > 52$ $\therefore x = 53$. Hence, [1].

8. $x = \frac{(108.2^2 + 104^2 - 208 \times 108.2)(108.2^2 + 104^2 + 104 \times 108.2)}{(108.2^3 - 104^3)}$
$x = \frac{(108.2^2 + 104^2 - 2 \times 104 \times 108.2)(108.2^2 + 104^2 + 104 \times 108.2)}{(108.2^3 - 104^3)}$
$[a^3 - b^3 = (a - b)(a^2 + b^2 + ab)]$
$x = \frac{(108.2 - 104)^2}{(108.2 - 104)}$ $[(a - b)^2 = a^2 + b^2 - 2ab]$
$x = 108.2 - 104$
$x = 4.2$
$\Rightarrow \left[\frac{x + 0.8}{x - 3.2}\right]^2 = \left(\frac{4.2 + 0.8}{4.2 - 3.2}\right)^2 = \left(\frac{5}{1}\right)^2 = 25$. Hence, [2].

9. The total red tiles initially = $2\left(\frac{m}{n}\right) - 1$
Total number of tiles = $\left(\frac{m}{n}\right)^2$
As number of red tiles > number of green tiles (since the room has odd number of tiles and corner tiles are red)
$\therefore$ Total red tiles required to form an alternate pattern = $\frac{\left(\frac{m}{n}\right)^2 + 1}{2} = \frac{m^2 + n^2}{2n^2}$
$\therefore$ Number of green tiles removed
$= \frac{m^2 + n^2}{2n^2} - 2\left(\frac{m}{n}\right) + 1 = \frac{m^2 + n^2 - 4mn + 2n^2}{2n^2}$
$= \frac{(m - 2n)^2 - n^2}{2n^2}$. Hence, [2].

10. $\frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy}$ ... (Since, $x + y + z = 0$; $x^3 + y^3 + z^3 = 3xyz$)
$= \frac{x^3 + y^3 + z^3}{xyz} = \frac{3xyz}{xyz} = 3$. Hence, [4].

11. $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$
$\Rightarrow x^{\frac{1}{3}} + y^{\frac{1}{3}} = -z^{\frac{1}{3}} \Rightarrow \left(x^{\frac{1}{3}} + y^{\frac{1}{3}}\right)^3 = (-z^{\frac{1}{3}})^3$
$\Rightarrow x + y + 3y^{\frac{1}{3}}x^{\frac{1}{3}}(x^{\frac{1}{3}} + y^{\frac{1}{3}}) = -z$
$\Rightarrow (x + y + z)^3 = 27xyz$. Hence, [1].

12. The best to solve this question is the method of reverse substitution. Since $\frac{1}{4} + \frac{1}{6} = \frac{5}{12}$, the answer is option 3.
Hence, [3].

13. If the numbers are (x – 2), x and (x + 2), then 3(x – 2) – 2 = 2(x + 2). ∴ x + 2 = 14, which incidentally is the third number. Hence, [2].

14. Let one number be x, so the other number would be(x + 4). We have to find 2 integers whose sum is 10 and the product is 21.
X(x + 4) = 21 or x = 3. Hence, [1].

15. The given equations are
2x – 8y = 3 ...(i)
kx + 4y = 10 ...(ii)
Suppose ax + by = c and dx + ey = f are two equations involving two variables x and y.
If $\frac{a}{d} = \frac{b}{e} \neq \frac{c}{f}$ then we get no solution for the given equations
$\frac{c}{f} = \frac{3}{10}$ and $\frac{b}{e} = -\frac{8}{4}$
$\therefore \frac{b}{e} \neq \frac{c}{f}$
So the above two equations will have not solution if $\frac{2}{k} = -\frac{8}{4}$
$\therefore k = -\frac{2 \times 4}{8} = -1.$
So for k = –1 the given equations have no solution.
Hence, [4].

16. Sita takes $\frac{1}{3}$ of the total mints kept there. This means the total number of mints in the bowl should be a multiple of 3. There is no option that satisfies this logic. Hence, [4].

17. Using the options, the sum of 25 & 16 is 41. Difference of 54 and 41 is 13. Hence, [2].

18. Let the three consecutive integers be (x – 1), x and (x + 1)
Now (x – 1) (x) (x + 1) = 3x × 40
$\therefore x^2 - 1 = 120$ [$\because$ x cannot be zero]
$\therefore x^2 = 121$
$x = \pm 11$
If x = 11, the numbers are 10, 11 and 12, and the largest number is 12.
If x = –11, the numbers are –10. –11, –12 and the largest number is –10.
∴ |Largest number| = 12 or 10.
Hence, [4].

19. Let the cost of each orange be 'a', each bananna be 'b' and each apple be 'c'.
∴ 3a + 5b + 2c = 40 ..... (1)
and 4a + 10b + 4c = 70
i.e. 2a + 5b + 2c = 35 ..... (2)
(1) – (2) gives
a = 5 i.e. 10a = 50. Hence, [2].

20. First number = (34 + x)
Second number = (43 – x)
Product = (34 + x) (43 – x) = 1482
$\Rightarrow 1462 + 9x - x^2 = 1482$
$\Rightarrow x^2 - 9x + 20 = 0$
$\Rightarrow$ (x – 5) (x – 4) = 0
$\Rightarrow$ x = 5 or x = 4
If x = 5, first number = 39 and second number = 38.
If x = 4, first number = 38 and second number = 39.
Hence the smaller number is 38. Hence, [2].

QA-1.5 | PERCENTAGES, PROFIT & LOSS, INTEREST

PRACTICE EXERCISE 1

1. 1% loss

2. 4 pcpa

3. $33\frac{1}{3}$ %

4. profit, 25%

5. 30% (SP is 117% of CP and also 90% of MP. So, MP = 117/90 CP = 1.3 CP.)

6. $\frac{5}{3}$ or $1\frac{2}{3}$ or $1.\overline{6}$

7. no profit no loss (60% of 40 = 40% of 60)

8. 20% (CP = 600. 4% reduction in Rs.750 will make the SP = Rs.720. So profit% = 20%)

9. 25%

10. 20 pcpa
(He was charged Rs.120 as interest on Rs.2400 for 3 months = ¼ year. So, 120 = $\frac{2400 \times \frac{1}{4} \times R}{100}$)

11. Original value = 3925 + 2355 = Rs.6280
Depreciation = Rs.2355

$\therefore$ % depreciation = $\frac{2355}{6280} \times 100$ = 37.5%. Hence, [1].

12. 25% of the good mangoes represent 261
$\therefore$ Total number of good mangoes = $\frac{261}{0.25}$ = 1044
87% of the total mangoes is represented by 1044
$\therefore$ Total number of mangoes = $\frac{1044}{0.78}$ = 1200.
Hence, [3].

13. Cost price of 15 books = 8 × 15 = Rs.120
Discount = $\frac{12.5}{100}$ = Rs.15. Hence, [4].

14. Let the population of each part be x
$\therefore$ 0.80x + 1.15x = 39390
x = $\frac{39390}{1.95}$ = 20200. Hence, [2].

15. $2520 + \frac{2520 \times R \times 4}{100} = 3024 \Rightarrow R = 5\%$
$\therefore \quad 520 + \frac{520 \times 5 \times T}{100} = 611 \Rightarrow T = 3.5$ years.
Hence, [3].

16. Let the price of 1 unit of electricity be Rs.x Varun initially consume y units.
Therefore he spent initially Rs.xy on electricity.
When the price of electricity decreased by 20%, the new price per unit of electricity is Rs.0.8x.
Varun decides to spend 10% less i.e. 0.90xy
Let the new consumption of electricity be U units
$\therefore$ 0.90xy = 0.8x × U

$\therefore$ U = $\frac{0.90}{0.80}$y

$\therefore$ U = 1.125y

He increased his consumption by 12.5%. Hence, [4].

17. For fixed rate amount to be paid after three years = $(1.06)^3 \times 300000$
= 1.191 × 300000 = Rs.357304.8
For floating rate
Amount for first year = 1.07 × 300000
= Rs.321000
Amount for second year = 1.06 × 321000
= Rs.340260
Amount for third year = 1.05 × 340260
= Rs.357273
Hence floating rate is beneficial by
357304.8 – 357273 = Rs.31.8. Hence, [3].

18. $1100 = P + \frac{P \times 5 \times \left(T - \frac{1}{2}\right)}{100}$

$1100 = P + \frac{P \times 4 \times T}{100}$

$1100 = P + \frac{P \times 5 \times \left(T - \frac{1}{2}\right)}{100} = P + \frac{P \times 4 \times T}{100}$

$\therefore \frac{P \times 5 \times \left(T - \frac{1}{2}\right)}{100} = \frac{P \times 4 \times T}{100}$

$\therefore 5T - \frac{5}{2} = 4T \therefore T = \frac{5}{2}$ years

$\Rightarrow 1100 = P\left(1 + \frac{4 \times \frac{5}{2}}{100}\right) = P\left(\frac{110}{100}\right)$

$\therefore$ P = Rs.1000. Hence, [2].

19. Let CP of 5 dozen mangoes be Rs.x.
SP = Rs.156 and Gain = 0.3x
$\therefore$ 156 – x = 0.3x $\quad\quad$ $\therefore$ x = 120
$\therefore$ SP of 60 mangoes = 120 × 1.6 = Rs.192
$\therefore$ SP per mango = Rs.3.2. Hence, [3].

20. Selling price = 800 × 1.25 = Rs.1000
$\therefore$ Marked price = Rs. $\frac{1000}{0.95} \approx 1053$. Hence, [2].

PRACTICE EXERCISE 2

1. $\frac{P \times 3.75 \times 3\frac{4}{12}}{100} = \frac{160 \times 2\frac{1}{2} \times 2\frac{1}{2}}{100}$
$\therefore$ P = Rs.80 Hence, [4].

2. Here $P\left[1-\frac{r}{100}\right]^n = 21600.$
$\therefore P\left[1-\frac{10}{100}\right]^3 = 21600.$
$\therefore P\left(\frac{9}{10}\right)^3 = 21600.$
$\therefore$ P $\approx$ 29630. Hence, [1].

3.

	CP	SP
A	x	1.2x
B	1.2x	1.2x × 1.1 = 1.32x
C	1.32x	1.32x – 120
D	1.32x × 120	

(1.32x – 120) – (x) = 200
$\therefore$ 0.32x = 320. $\therefore$ x = Rs. 1000.
Therefore, the initial cost of the camera is Rs.1000
Hence, [2].

4. 4.15% may not be an easily identifiable percentage.
But $4.15\% \times 2 = 8.3\% \approx \frac{1}{12}\left(\frac{1}{12} \approx 8.33\%\right)$
$\therefore 4.15\% \approx \frac{1}{24}$
Similarly $3.84\% \times 2 = 7.68\% \approx \frac{1}{13}$
$\therefore 3.84\% \approx \frac{1}{26}$ $\therefore \frac{25}{26}$ M.P. = S.P.
also $\frac{25}{24}$ C.P. = S.P.
$\therefore \frac{25}{26}$ M.P. = $\frac{25}{24}$ C.P.
$\therefore \frac{M.P.}{C.P.} = \frac{25}{24} \times \frac{26}{25}$
$\therefore \frac{M.P.}{C.P.} = \frac{13}{12} = 1 + \frac{1}{12}$
Now $\frac{1}{12} = 8.33\%$
$\therefore$ Mark up percentage = 8.33%.
Hence, [4].

5. Let there were x men and y women present in the party.
$\therefore$ x + y = 55 ..... (i)
40% of the women wore earrings, so the number of women wearing earrings was 0.4y.
Hence, total number of earrings was 0.8y.
60% of women and 50% of men wore goggles.
Total number of goggles =
0.5x + 0.6y = 1.5 the number of earrings.
i.e., 0.5x + 0.6y = 1.5(0.8y)
$\Rightarrow$ 0.5x = 0.6y ..... (ii)
Solving (i) and (ii), we get, x = 30 and y = 25.
Hence, 10 women wore earrings.
$\Rightarrow$ total number of earrings were 20. Hence, [3].

6. Suppose there are 100 students in the school; then 40 of them being boys, 60 are girls.
Number of successful students = 40.
Number of successful girls = $\frac{20}{100} \times 60 = 12.$
$\therefore$ Percentage of boys who passed = $\frac{40-12}{40} \times 100 = 70.$ Hence, [3].

7. Having secured $\frac{500}{600}$, Teena got $\frac{500}{600} \times 100 \approx 83.33\%$.
Hence Beena scored (approximately) 85.33%, or equivalently $\frac{85.33}{100} \times 600 = 512$ marks (out of 600).
Then, Meena, having secured 75.33% (10% less than Beena), scored $\frac{75.33}{100} \times 600 = 452$ marks (out of 600).
Hence Seema got 452 + 16 = 468 marks (out of 600), which is $\frac{468}{600} \times 100 = 78\%$.
Hence, [4].
Alternatively,
Maximum marks possible in the exam = 600
$\Rightarrow$ 1% $\equiv$ 6 marks.
Thus, Teena $\equiv$ 500 marks
Beena (+2%) $\equiv$ 500 + 2(6) = 512 marks
Meena (–10%) $\equiv$ 512 – 10(6) = 452 marks
Seema $\equiv$ 452 + 16 = 468 marks
$\equiv \frac{468}{6}\% = 78\%.$
Hence, [4].

8. Let the number of women wearing 1 colour, 2 colour and 3 colour dresses be a, b and c respectively.
b + c = 70% of the female population.
$\therefore$ a = 30% of the female population = 1200.
$\therefore$ Female population = $\frac{1200}{0.3}$
$\therefore$ Female population = 4000. Hence, [1].

9. Let the marks obtained in English and Hindi be x and y respectively.
x + 1.5x + 48 + 2y = 256 ... (i)
0.5x + 2.5x + 48 + 2y = 280 ... (ii)

From (i) and (ii) we get
x = 48, y = 44
Marks in Math and Science = 256 – (48 + 44) = 164

$\therefore$ Required percentage = $\frac{164}{200} \times 100 = 82\%$.
Hence, [2].

10. E's C.P. = 500000 × 0.85 × 0.9 × 0.82 × 1.11.
= 348151.5. Hence, [1].

11. Let the shopkeeper buy goods worth Rs.x.

$$\therefore \frac{1}{3} \times x \times \frac{120}{100} + \left(x - \frac{x}{3}\right) \times \frac{3}{8} \times \frac{80}{100} + \left[x - \frac{x}{3} - \left(x - \frac{x}{3}\right) \times \frac{3}{8}\right] \times y \times \frac{80}{100} = \frac{110}{100} x$$

Where y is the factor by which the price of remaining goods is increased.

$\therefore 0.4x + 0.2x + \frac{5x}{12} \times y \times \frac{80}{100} = 1.1x$

$\frac{xy}{3} = 0.5x \ \therefore y = 1.5$

$\therefore$ The goods should be marked at 50%. Hence, [1].

12. Let the merchant buy 50x watches at Rs.6000 per 12 pieces and the same number Rs.15000 per 25 pieces.

$\therefore$ Cost of 50x watches @ Rs.6000 per dozen

$= \frac{50x \times 6000}{12} = 5x \times 5000$

Cost of 50x watches @ Rs.15000 per 25 pieces

$= \frac{50x \times 15000}{25} = 2x \times 15000$

$\therefore$ Cost of 100x watches = Rs.55000x
Now selling price of 100x watches = Rs.68000x
$\therefore$ Profit, 68000x – 55000x = 13000x = Rs.39000
$\therefore$ x = 3.
$\therefore$ He bought 100 × 3 = 300 watches. Hence, [1].

13. Let CP be Rs.x $\therefore$ MP = 1.8x
SP of 15 articles = 12 × 1.8x = 21.6x
$\therefore$ Discount = 0.9 × 21.6x = 19.44x
$\therefore$ Profit on 15 articles = (19.44 – 15)x = 4.44x
$\therefore$ Profit % = $\frac{4.4x}{15x} \times 100 = 29.6\%$. Hence, [3].

14. Let 'P' be the initial investment.
Scheme I:
Amount at the end of 3 years

$= P\left(1 + \frac{10}{100}\right)^3 = P\left(\frac{11}{10}\right)^3 = \frac{1331P}{1000}$ ..... (i)

Scheme II:
Let 'R' be the rate of interest for the third year.
$\therefore$ Amount at the end of three years

$$\frac{P \times 10 \times 2}{100} + \frac{P \times 1 \times R}{100} + P$$

$= \frac{P}{5} + \frac{PR}{100} + P$ ..... (ii)

Equating (i) and (ii),

$\therefore \frac{1331P}{1000} = \frac{P}{5} + \frac{PR}{100} + P$

$\frac{1331}{1000} - \frac{6}{5} = \frac{R}{100} \ \therefore \frac{655}{5000} \times 100 = R$

$\therefore$ R = 13.1%. Hence, [1].

15. $\frac{100 - \text{loss}\%}{100} = \frac{\text{True weight}}{\text{False weight}}$

$\therefore 100 - \text{loss}\% = \frac{1}{1.2} \times 100$

$= \frac{1000}{12} = 83.33$

$\therefore$ loss% = 100 – 83.33

$= 16.67\%$ or $16\frac{2}{3}\%$. Hence, [2].

16. Suppose the price of sugar is Rs. 10 per kg and the consumption of sugar is 10 kg. Therefore, the current expenditure on sugar = Rs. 100. If the price of sugar increases by 50%, new price = Rs. 15 per kg. If the increase in expenditure is 20%, the new expenditure on sugar will be Rs. 120.

$\therefore$ New consumption of sugar = $\frac{120}{15} = 8$ kg

Therefore, the family should reduce its consumption of sugar by 20%.
Hence [2].

17. CP of the merchant who calculates his % profit on
CP = $\frac{3760}{1.175} = Rs.3200$

$\therefore$ His profit = 0.175 × 3200 = Rs.560

Profit of the merchant who calculates his % profit on
SP = 0.175 × 3760 = Rs.658
$\therefore$ Difference in profit = 658 – 560 = Rs.98.

18. $P(1 + r)^2 = 6272$ ..... (I)
$P(1 + r)^3 = 7024.64$ ..... (II)
Equation (II) divided by equation (I) yields

$1 + r = \frac{7024.64}{6772} = 1.12$

Therefore, r = 12%. Putting the value of r = 12% in (I), we get

$P = \frac{6272}{1.12^2} = 5000$

Therefore, the required answer is 5000.

19. Suppose the CP of one bat = 4.

Therefore, the SP of one bat = $\frac{4 \times 5}{4}$ = 5.

Therefore, profit % = $\frac{5 - 4}{4} \times 100 = 25\%$.
Hence [4].

20. Suppose the Cp of the smaller diamond = a and the CP of the larger diamond = b.
Therefore we have –

	CP	SP
Smaller	a	1.2a
Larger	b	0.9b
Total	a + b	1.2a + 0.9b

$\therefore$ Total loss = 0.1b – 0.2a

Loss% = $1\frac{9}{11}\% = \frac{20}{11}\%$

$\therefore \frac{\text{Loss}}{\text{CP}} = \frac{\frac{20}{11}}{100} = \frac{20}{11} \times \frac{1}{100} = \frac{1}{55}$

$\therefore$ We have –

$\frac{0.1b - 0.2a}{a + b} = \frac{1}{55}$

$\therefore$ 5.5 b – 11a = a + b

$\therefore$ 4.5b = 12a

$\therefore \frac{b}{a} = \frac{12}{4.5} = \frac{8}{3}$

Required ratio = $\frac{0.9b}{1.2a} = \frac{3}{4} = \frac{b}{a}$

$\therefore$ Required answer = $\frac{3}{4} \times \frac{8}{3} = \frac{2}{1}$
Hence, [2].

PRACTICE EXERCISE 3

1. Suppose P is the principal and r is the rate of interest per annum.
The ratio of the compound interest to simple interest = 331 : 300. Suppose the compound interest is 331x and the simple interest is 300x over the 3 years.
We have,

Year	1	2	3
Simple interest	100x	100x	100x
Compound interest	100x	100x(1 + r)	$100x(1 + r)^2$

Therefore, we have
$100x(1 + r) + 100x(1 + r)^2 = 231x$
$\therefore$ 200x + 100x(3r + r2) = 231x
$\therefore r^2 + 3r = 0.31$
Solving for r, we get r = 0.1 or r = 10%.
Therefore, the required answer is 10%.

2. The price of the house after 'n' years = 80,00,000 $\times$

$\left(1 - \frac{1}{8}\right)^n = 80,00,000 \times \left(\frac{7}{8}\right)^n$

The value of his investment after 'n' years = 40,00,000 $\times \left(1 + \frac{12.5n}{100}\right)$ = 5,00,000 × (n + 8)

$\therefore$ 5,00,000 × (n + 8) > $80,00,000 \times \left(\frac{7}{8}\right)^n$

$\therefore (n + 8) > 16 \times \left(\frac{7}{8}\right)^n$

This equation is satisfied for 3 and all numbers greater than 3.
Therefore, the required answer is 3.

3. Let the rate of interest be r% p.a.

$\therefore \frac{P \times r}{100} = 105$ ..... (I)

The principal amount for the 2nd year will be P + 105 + 45 = P + 150

$\therefore \frac{(P + 150) \times r}{100} = 1765.50 - (P + 150)$

i.e. $\frac{(P + 150) \times r}{100} = 1615.50 - P$ ..... (II)

Dividing equations I and II, we get

$\frac{P}{P + 150} = \frac{105}{1615.50 - P}$

$\therefore 1615.5P - P^2 = 105P + 15750$
$\therefore P^2 - 1510.5P + 15750 = 0$
$\therefore (P - 1500)(P - 10.5) = 0$
$\therefore$ P = 1500 or P = 10.5
If P = 10.5, then r = $\frac{105 \times 100}{10.5} = 1000\%$.
If P = 1500, then r = $\frac{105 \times 100}{1500} = 7\%$.
Hence [4].

4. Let the CP of mangoes per kg be Rs. X. Let the quantity sold on profit be y kg.
$\therefore X \times 0.15 \times 40 = X \times 0.2 \times y$
$\therefore$ y = 30 kg
Hence [3].

5. Suppose the Marked Price = 100.
Therefore the Selling Price after three successive discounts of 10%
= 100 × 0.9 × 0.9 × 0.9 = 72.9
The Selling Price after two successive discounts of x% = $100 \times (1 - x)(1 - x) = 100(1 - x)^2$
$\therefore 100(1 - x)^2 = 72.9$
$\therefore (1 - x)^2 = 0.729$
$\therefore 1 - x = \sqrt{0.729} = 0.8538$
$\therefore$ x = 0.1462 or 14.62%
Hence, [2].

6. Rate of inflation = 1000%
∴ The amount of increase = 10 times the original amount.
Thus, the new amount would be (10 + 1) = 11 times the original amount.
Present cost of the article = 6 units.
Thus, cost after 2 years = 6 × 11 × 11 = 726 units.
Hence, [4].

7. Number of leap years in the 20th century (1901 – 2000) = Number of leap days (Feb 29th) = 25
Number of days in the 20th century = (100 × 365) + 25 = 36525.
Thus, required percentage = $\left(\frac{25}{36525}\right)$ × 100 = 0.0684%. Hence, [3].

8. Let the maximum marks in each paper be 100. So he gets 6x, 7x, 8x, 9x and 10x in each of the papers respectively. Then 60% of total marks = 40x ⇒ 300 = 40x ⇒ x = 7.5
Therefore, the percentage marks in each paper is 45 %, 52.5 %, 60 %, 67.5 % and 75 % respectively. So, in 4 papers he scored than 50 % marks. Hence, [3].

9. Let the total population be x. Then the amount received right now is: 0.6x × 600 = 360x which is 75% of the amount. Therefore, the total amount required is 480x. Hence, the remaining amount = 480x – 360x = 120x.
So, required contribution per head = $\frac{120x}{0.4x}$ = 300.
Hence, [1].

10. Total weight of fresh grapes = 20 kg
Weight of the solid part = $\frac{20 \times 10}{100}$ = 2 kg
In dried grapes, water is 20%, so solid part is 80%
Therefore, total weight of dried grapes = $\frac{2}{80}$ × 100 = 2.5kg
Hence, [3].

11. Let the original price be A
Also let x% = P
Now,
⇒ A – A(1 – P)(1 + P) = 441
⇒ A – A(1 – P)^2 = 441
⇒ AP^2 = 441 ..... (I)
Also, A[(1 + P)(1 – P)]^2 = 1944.81
A[(1 – P)^2]^2 = 1944.81 ..... (I)
Dividing (II) by (I) we get
$\frac{(1 - P^2)^2}{P^2} = \frac{441}{1944.81} = 4.41$
$\frac{1 - P^2}{P} = 2.1$
1 – P^2 = 2.1P
⇒ 10 – 10P^2 = 21P
⇒ 10P^2 + 21P – 10 = 0
Solving we get P = $-\frac{5}{2}$ or P = $\frac{2}{5}$
As P cannot be negative, P = $\frac{2}{5}$
Now AP^2 = 441
∴ A × $\frac{4}{25}$ = 441
⇒ A = 2756.25
Hence, [1].
Alternatively,
Working backwards, using the options option [4] and [2] cannot be the answer because after one cycle, their value will be less than the selling price given after the 2nd up down cycle. Option [3] after cycle 1 will become 2059. Now 2059-1944.81 = 115.19. However, after the 2nd up down cycle 2059 will reduce by a value just not much less than 441. So after, cycle 2, it will be definitely less than the given selling price of 1944.81. Hence option [1] i.e. 2756.25 is the correct answer.

12. 40 × 0.75 = 30 % of men earn > 25,000 a year.
So percentage of women earning > 25,000
= 45 – 30 = 15%.
Total percentage of women = 60%.
So fraction of women earning > 25000 = $\frac{15}{60} = \frac{1}{4}$.
Hence, [2].

13. Let M.P. = Rs.100
Since discount is 15%, S.P. – 100 15 – 85
Let the C.P. be Rs. 'x'
As the profit percentage is 2
$2 = \frac{85 - x}{x} \times 100$
2x = 8500 – 100x
⇒ 102x = 8500
⇒ x = $\frac{250}{3}$
Now, let us suppose that S.P. is Rs. 'y'. To ensure profit is 20%.
$20 = \frac{y - \frac{250}{3}}{\frac{250}{3}}$
$\frac{5000}{3} = 100y - \frac{25000}{3}$
⇒ 100y = $\frac{30000}{3}$
100y = 10000
y = 100
So, the seller should sell at the marked price or retail price to ensure a profit of 20%. Hence, [4].

14. Let us assume that the total production cost is Rs. 100.
So, component A's share in this would be Rs. 30 and that of B would be Rs. 50.
Other expense s = 100 – (30 + 50) = Rs 20
The product is currently sold at 20% profit = Rs. 120.

Now due to change in international scenario,
Cost of component A = 1.3 × 30 = 39
Cost of component B = 1.22 × 50 = Rs. 61.
Therefore, the total cost of production of the product = (39 + 61 + 20) = Rs. 120 (Note that no change has been indicated in other expenses.)
It is further said that selling price cannot be increased beyond 10%. Therefore, the maximum selling price can be Rs. 132.
Therefore, the maximum gain = $\frac{12}{120}$ = 10%.
Hence, [1].

15. The cost of component A = (1.2 × 30) = Rs. 36 and that of B will be (0.88 × 50) = Rs. 44
So the total cost of production = (36 + 44 + 20) = Rs. 100 Since the selling price is not altered, i.e. Rs. 120, the gain will be the same as the original one, i.e. 20%.
Hence, [2].

16. The equations are as follows:
$2000\left(\frac{x}{100}\right) + 2000\left(\frac{y}{100}\right) = 700$ which can be simplified to x + y = 35.....(1)
$2000\left(\frac{x}{100}\right) + 3000\left(\frac{y}{100}\right) = 900$which can be simplified to 2x + 3y = 90.....(2)
On solving (1) & (2), we get, x = 15.
Hence, [2].

17. Let the price per metre of cloth be Re 100.
The shopkeeper buys 120 cm, but pays for only 100 cm. In other words, he buys 1.2m forRs. 100. So his CP per meter = $\frac{100}{1.2}$ = 83.33 Rs.
Now he sells 80 cm but charges for 100 cm. In other words, he sells 80 cm for Rs 100. On this, he offers a 20% discount on cash payment. Therefore, the per metre selling price = Rs 100.
Therefore, % Profit = $\frac{100 - 83.33}{83.33} \times 100 = 20\%$
Hence, [1].

18. Assume that he hasRs. 100. In this, he can buy 50 oranges or 40 mangoes.
Therefore, the price of an orange is Rs 2 and that of a mango is Rs 2.50.
Now if he decides to keep 10% of his money for taxi fares, he would be left with Rs. 90.
Now if he buys 20 mangoes, he would spend Rs. 50 and will be left with Rs. 40, in which he can buy 20 oranges. Hence, [4].

19. Let there be 100 voters in all.
So initially there were 40 of these who promised to vote for P, while 60 of them promised to vote for Q. On the last day, (15% of 40) = 6 voters shifted their interest from P to Q and (25% of 60) = 15 voters shifted their interest from Q to P.
Therefore, number of final voters with P = 40 – 6 + 15 = 49 votes
Number of votes with Q = 60 – 15 + 6 = 51 votes.
Therefore, margin of victory for Q = (51 – 49) = 2.
Hence, there were 100 voters in all. Hence, [1].

20. Let the present ages of Arun and Barun be 4x and 10x respectively.
$\therefore \frac{4x + y}{10x + y} = \frac{1}{2}$
$\Rightarrow 8x + 2y = 10x + y$
$\Rightarrow y = 2x$
So, in 'y' years, Barun's age increases from 10x to 12x
Percentage increase in Barun's age
$= \frac{12x - 10x}{10x} \times 100 = \frac{2x}{10x} \times 100 = 20\%$
Therefore, the required answer is 20.

QA-1.6 | RATIO, PROPORTION AND VARIATION

PRACTICE EXERCISE 1

1. Let Aman's current age be a years and Boman's current age be b years.

$\therefore \frac{a}{b} = \frac{3}{4}$

$\therefore$ 4a – 3b = 0
i.e. 36a – 27b = 0 ..... (1)
Five years hence,

$\frac{a+5}{b+5} = \frac{7}{9}$

$\therefore$ 9a – 7b = –10
i.e. 36a – 28b = –40 ..... (2)
(1) – (2) gives

b = 40 and $a = \frac{3b}{4} = \frac{3 \times 40}{4}$ = 30. Hence, [4].

2. Let, p_d and p_g be the prices of diamond and gold respectively.
Let, w_d and w_g be the weights of diamond and gold respectively.

$\therefore p_d = kw_d^2$ and $p_g = k'w_g$
k, k′ are constants of proportionality.
Let w be the weight of each ring.
For ring with 3 gms diamond:
9k + k′ (w – 3) = a ..... (i)
For ring with 4 gms diamond:
16k + k′ (w – 4) = b ..... (ii)
For ring with 5 gms diamond:
25k + k′ (w – 5) = c ..... (iii)
Using (i) and (ii) : 7k – k′ = b – a
Using (ii) and (iii) : 9k – k′ = c – b

$\Rightarrow k = \frac{a+c}{2} - b.$

Price of 1 gm diamond,

$p_d = k(1)^2 = k = \frac{a+c}{2} - b$. Hence, [3].

3. Suppose the quantities of the three types of apples to be mixed are x, y and z respectively.

$\therefore \frac{5x+6y+8z}{x+y+z} = 7$

$\therefore$ 5x + 6y + 8z = 7x + 7y + 7z
$\therefore$ z = 2x + y
Therefore multiple answers are possible. Hence, [4].

4. Suppose the volume of each vessel = x

$\therefore$ Total quantity of water in the container = $\frac{5x}{9} + \frac{3x}{11} + \frac{x}{12} = \frac{361}{396}x$

Total quantity of liquid in the container = 3x

$\therefore$ Required percentage = $\frac{361}{1188} \times 100 = 30.4\%$
Hence, [2].

5.

	Original	Present
Wages	22x	25x
Labourers	15y	11y

Ratio of total wages = $\frac{22x \times 15y}{25x \times 11y} = \frac{6}{5}$

If the present bill is Rs.5000, the original was Rs.6000. Hence, [4].

6. Let the incomes be 4x and 3x.
So, their expenses will be (4x – 600) and (3x – 600)

$\therefore \frac{4x-600}{3x-600} = \frac{3}{2} \therefore \frac{x}{3x-600} = \frac{1}{2}$ (dividendo)

$\therefore$ x = 600
$\therefore$ Their incomes are Rs.2400 and Rs.1800.
Hence, [3].

7. If V is the value, d is the diameter and t is the thickness, $V \alpha d^2t \quad \therefore V = Kd^2t$
Ratio of diameters = 4 : 3 and ratio of thickness $t_1 : t_2$

$\therefore \frac{V_1}{V_2} = \frac{K \times 16 \times t_1}{K \times 9 \times t_2} \Rightarrow \frac{4}{1} = \frac{16t_1}{9t_2} \therefore \frac{t_1}{t_2} = \frac{9}{4}$

$\therefore$ Ratio = 9 : 4. Hence, [4].

8. The required ratio

$$= \frac{\frac{4}{3}\pi\left(\frac{27}{8}-1\right)r^3}{\frac{4}{3}\pi r^3} \times \frac{4\pi r^2}{4\pi\left(\frac{9}{4}-1\right)^2}$$

$= \frac{19}{8} \times \frac{4}{5} = \frac{19}{10}$. Hence, [3].

9. Let his marks be 100, 90, 80, 70 and 60 in the five subjects. Therefore, he scored 400 marks in total. This constitutes only 60% of the total marks. Hence, total marks = $\frac{5}{3} \times 400 = 667$, which incidentally is the maximum marks in all 5 subjects. Since the total marks in each subject is the same, hence maximum marks in each subject will be $\frac{667}{5} = 133$. Out of this, 50% is the passing marks. In other words, to pass in a subject he needs to score 66.5 marks. We can see that only in one subject he scored less than this, viz. 60. Hence, he passed in 4 subjects. Hence, [3].

10. Let the marks in the subjects be P, M, B and C respectively.
Assuming maximum marks per subject to be 100.
$\therefore$ B : C = 5 : 7
P : M = 1 : 1
and B : M = 3 : 2
$\therefore$ B : M : C = 15 : 10 : 21
and P : B : M : C = 10 : 15 : 10 : 21

$\therefore$ Average marks = $\frac{10x + 10x + 15x + 21x}{4}$

$= \frac{56x}{4} = 14x$

$\therefore 14x = 64$

$\therefore x = \frac{64}{14} = \frac{32}{7} \approx 4.57$

$\therefore 10x \approx 45$, $15x \approx 68.5$ and $21x \approx 96$
Thus, the student has scored more than 50% in 2 subjects. Hence, [2].

11. Total charge = fixed + variable
$T_C = m + kx$; where m and k are constants.
$\therefore 300 = m + k \times 20$
Also, $550 = m + k \times 45$
Solving for m and k; we get m = 100; k = 10.
Hence, for 100 grams, total charge
$= 100 + 10 \times 100 =$ Rs.1100. Hence, [3].

12. Let $R = k_1 + k_2 n$
[R is rent, n is number of passengers and k_1, k_2 are some constants]
$\therefore 2200 = k_1 + 10k_2$ ---------- (1)
also $3400 = k_1 + 20k_2$ ---------- (2)
(2) – (1) $\Rightarrow k_2 = 120$
$\therefore$ by (1),
$k_1 = 1000$. Hence, [3].

13. Equation will be of the form: $700 \times 25 = F + 25V$ and $600 \times 50 = F + 50V$.
Solving we get V = 500, F = 5000.
For 100 boarders total cost
$= 5000 + 50000 = 55000$.
Average expenses per boarder = $\frac{55000}{100} = 550$.
Hence, [1].

14. If $x < y$, $y - \frac{x}{2} = 3\left(x - \frac{x}{2}\right)$.
Therefore, $\frac{x}{y} = \frac{2}{1}$
Hence, [1].

15. Let the number of cards with Mushtaq be 'a' and let the number of cards with Iqbal be 'b'. If Mushtaq gives Iqbal x cards, then we have the equation : $b + x = 4(a - x)$ i.e. $4a - b = 5x$. Conversely, if Iqbal gives Mushtaq x cards, then we have the equation : $b - x = 3(a + x)$ i.e. $b - 3a = 4x$. Solving the two equations we get, a = 9x and b = 31x. In a pack of 52 cards, the only possible value for 'b' could be 31. Hence, [2].

16. $A^2 = k_1 B^3$ & $B = k_2 C^{1/2}$
where k_1,k_2 are some constants.
$\therefore B^3 = k_2^3 C^{3/2}$ $\quad\quad$ $\therefore A^2 = k_1 k_2^3 C^{3/2}$

$\therefore A = k C^{3/4}$ $\quad \left[k = \sqrt{k_1 k_2^3}\right]$

Now $4 = k \times (81)^{3/4}$

$\therefore k = \frac{4}{27}$.

Now $3 = \frac{4}{27} \times (C)^{3/4}$

$\therefore (C)^{3/4} = \frac{81}{4}$

$\therefore C = \left(\frac{81}{4}\right)^{4/3}$

$= \left(\frac{9}{2}\right)^{8/3} = (4.5)^{\frac{8}{3}}$

Hence, [3].

17. Since the number of coins are in the ratio 2.5 : 3 : 4, the values of the coins will be in the ratio (1 × 2.5) : (0.5 × 3) : (0.25 × 4) = 2.5 : 1.5 : 1 or 5 : 3 : 2.
Total Amount = Rs 210. Let the value of each type of coin be Rs 5x, 3x, 2x. The average value per coin = $\frac{210}{10x}$.
So, the value of 1 Rupee coins will be $5x \times \frac{210}{10x}$ = Rs 105
So, the total number of 1 rupee coins will be 105.
Hence, [4].

18. Let the original weight of the diamond be 10x. Hence, its original price will be $k(100x^2)$ . . . where k is a constant. The weights of the pieces after breaking are x, 2x, 3x and 4x. Therefore, their prices will be kx^2, $4kx^2$, $9kx^2$ and $16kx^2$. So the total price of the pieces = $(1 + 4 + 9 + 16)kx^2 = 30kx^2$.
Hence, the difference in the price of the original diamond and its pieces = $100kx^2 - 30kx^2 = 70kx^2 =$ 70000. Hence, $kx^2 = 1000$ and the original price = $100kx^2 = 100 \times 1000 = 100000$ = Rs. 1 lakh.
Hence, [3].

Answer for questions 19 and 20.

Let x be the free luggage allowance and Rs. y be the fixed rate per kg for excess luggage.
Let Raja carry r kgs and Praja carry p kgs $\quad \therefore r + p = 60$
Then $(r - x)y = 1200$
$(p - x)y = 2400$,

and $(60 - x)y = 5400 \ \therefore \ \frac{r - x}{p - x} = \frac{1}{2}$

$\therefore 2r - 2x = p - x \therefore 2r - p = x$ .....(1)

$\frac{p - x}{60 - x} = \frac{2400}{5400} = \frac{4}{9}$

$\therefore 9p - 9x = 240 - 4x \ \therefore 9p - 5x = 240$ ..... (2)

From (1) and (2)

$9p - 5(2r - p) = 240 \therefore 9p - 10r + 5p = 240$

$\therefore 14p - 10r = 240 \ \therefore 7p - 5r = 120$ ..... (3)

$r + p = 60$

Solving simultaneously,

$p = 35$ and $r = 25$

Substituting in [1],

$2(25) - 35 = x \ \therefore x = 15$ kgs.

19. Hence, [3].

20. Hence, [2].

PRACTICE EXERCISE 2

1. $\frac{a}{d} = \frac{a}{b} \times \frac{b}{c} \times \frac{c}{d} = \frac{1}{3} \times 2 \times \frac{1}{2} = \frac{1}{3}$

$\frac{b}{e} = \frac{b}{c} \times \frac{c}{d} \times \frac{d}{e} = 2 \times \frac{1}{2} \times 3 = 3$

$\frac{c}{f} = \frac{c}{d} \times \frac{d}{e} \times \frac{e}{f} = \frac{1}{2} \times 3 \times \frac{1}{4} = \frac{3}{8}$

$\frac{abc}{def} = \frac{a}{d} \times \frac{b}{e} \times \frac{c}{f} = \frac{1}{3} \times 3 \times \frac{3}{8} = \frac{3}{8}$.

Hence, [1].

2. $\frac{a}{b + c} = \frac{b}{c + a} = \frac{c}{a + b} = \frac{a + b + c}{2(a + b + c)} = r$

if $a + b + c \neq 0$, then $r = \frac{1}{2}$

If $a + b + c = 0$; $\frac{a}{b + c} = \frac{b}{c + a} = \frac{c}{a + b} = r = \frac{-(b + c)}{b + c} = -1$

Hence, $\frac{1}{2}$ or -1. Hence, [3].

3. Let the minimum runs to be scored by the fourth batsman be x.

$\therefore \frac{x}{(10 + 5 + 5 + x)} \times 20000 = 15000$

$\therefore x = 60$. Hence, [4].

4. 1 woman's share = Share of 3 boys
1 man's share = Share of 3 boys + Share of 1 boy
$\therefore$ 7 men, 11 women and 5 boys will be equivalent to 28 + 33 + 5 = 66 boys
Share of 66 boys = Rs.79.20
Share of 1 boy = Rs.1.20
Share of 1 man = Rs.4.80. Hence, [3].

5. Suresh's inheritance $= \frac{3}{3 + 6 + 5} \times 70000$
$= $ Rs.15000.
Dinesh's inheritance $= \frac{6}{3 + 6 + 5} \times 70000$
$= $ Rs.30000.
Hemant's inheritance $= \frac{5}{3 + 6 + 5} \times 70000$
$= $ Rs.25000.
Suresh's investment $= \frac{2}{3} \times 15000$
$= $ Rs.10000.
Dinesh's investment $= \frac{2}{5} \times 30000$
$= $ Rs.12000.
Hemant's investment $= \frac{13}{25} \times 25000$
$= $ Rs.13000.
Suresh's contribution
$= \frac{10000}{10000 + 12000 + 13000} = \frac{10}{35} = \frac{2}{7}$.
Hence, [1].

Answers to questions 6 to 8:

The best way to solve this sum is to work backwards. Let us assume that Alphonso's total property was of Rs.x.

	Widow	Mother	Ben	Carl	Dave	Total Share
Alphonso	x/2		x/6	x/6	x/6	x
Ben	x/12			x/24	x/24	x/6
Carl	5x/48				5x/48	5x/24
Dave	15x/96	15x/96				15x/48

6. Since Alphonso's wife is also the mother of Dave, the total share of this lady would be $\frac{x}{2} + \frac{15x}{96} = \frac{63x}{96}$.
And this share is equal to 1,575,000. So x = 2400000 or 24 lakhs. This is the worth of the total property. Hence, [4].

7. Carl's total share was $\frac{5x}{24} = 5 \times \frac{24}{24} = 5$ lakhs.Hence, [4].

8. The ratio's of the property's owned by the widows of the 3 sons = $\frac{1}{12} : \frac{5}{48} : \frac{15}{96} = 8:10:15$.
Hence, [2].

For answers to questions 9 and 10:

Using the given data, we can draw the following table.

	Male	Female	
White Collar	4.8x	3.2x	8x
Blue Collar	2.2x	0.8x	3x
	7x	4x	11x

Now, all the questions can be answered.

9. $\frac{\text{Female white collar employees}}{\text{Male blue collar employees}} = \frac{3.2x}{2.2x} = \frac{16}{11}$.
Hence, [1].

10. $\therefore 0.8x = 48 \therefore x = 60$
$\therefore$ Required difference = $4.8x - 48$
$= 4.8 \times 60 - 48 = 240$. Hence, [2].

11. Let bag 1 have x mangoes and bag 2 have y mangoes.

	x mangoes	y mangoes
Step 1	$\frac{x}{2}$	$y + \frac{x}{2}$

But $\frac{x}{2} : y + \frac{x}{2} = y : x$

Step 2	$\frac{2}{3}y + \frac{2}{3}x$	$\frac{1}{3}y + \frac{1}{3}x$

$\therefore$ Required ratio = $\frac{\frac{2}{3}y + \frac{2}{3}x}{\frac{1}{3}y + \frac{1}{3}x} = \frac{2\left(\frac{x+y}{3}\right)}{1\left(\frac{x+y}{3}\right)} = 2 : 1.$
Hence, [1].

12. Volume = $\frac{\text{Mass}}{\text{Density}}$
$\therefore$ Ratio of volumes = $\frac{4}{4} : \frac{5}{2} : \frac{7}{1} = 2 : 5 : 14$
$\therefore$ Volume of first oil = $\frac{2}{21} \times 1050 = 100$ lit.
Hence, [1].

13. The ratio is $\frac{1}{3} : \frac{1}{18} : \frac{1}{27}$ i.e. 18 : 3 : 2
Now $18x + 3x + 2x = 345$
$\therefore x = 15 \Rightarrow 18x = 270$. Hence, [2].

14. The percentage of people below 35 years of age = 64.75
Therefore, total number of people = 617.76 million
Total number of females = $617.76 \times 0.3 \times \frac{0.96}{1.96} =$ 90.8 million. Hence [2].

15. Each eats $\frac{5+3}{3} = \frac{8}{3}$ loaves. Ratio of money that they should share is $5 - \frac{8}{3} : 3 - \frac{8}{3} = \frac{7}{3} : \frac{1}{3}$ or 7 : 1. So first should receive 7 coins.
Hence [2].

16. A's Monthly Rent : B's Monthly Rent : C's Monthly Rent
$= 22 \times 4 : 16 \times 8 : 32 \times 6$
$= 11 : 16 : 24$ (Dividing by 8)
C's monthly rent = Rs.600
$\frac{24}{11 + 16 + 24} \times$ Total rent = 600
$\therefore \frac{24}{51} \times$ Total rent = 600
$\therefore$ Total rent = $\frac{600 \times 51}{24}$ = Rs.1275.
Hence, [3].

17. 85% of the total profit is divided in the ratio 2 : 10 : 5.
85% of total profit = 2x + 10x + 5x = 17x
Total profit = $\frac{17x}{85\%} = 20x$
$\therefore$ Share of Ram in the profit
= 2x + 15% of 20x = 2x + 3x = 5x
Share of Shyam in the profit = 10x
Share of Ghanshyam in the profit = 5x
Now, (10x + 5x) – 5x = 500
$10x = 500 \Rightarrow x = 50$
$\therefore$ Total profit = 20×50 = Rs.1000.
Hence, [1].

18. Let the total profit be Rs.x
$\therefore 0.18x - 3500 = 100$
$\therefore 0.18x = 3600$
$\therefore x = 20000$.
Hence, [3].

19. Let Ram invest Rs.5x and let Seeta invest Rs.6x.
After 3 months.
Ram withdrew Rs.x and Seeta withdrew Rs.x
$\therefore$ For Ram: capital × period = $5x \times 3 + 4x \times 9 = 51x$
For Seeta: capital × period = $6x \times 3 + 5x \times 9 = 63x$.
$\therefore$ Seeta's share = $\frac{63x}{114x} \times 22800 = 12600$.
Hence, [1].

20. Let the period of investments of A, B, C, D be t_A, t_B, t_C and t_D respectively.
$\therefore 7t_A : 12t_B : 14t_C : 10t_D$
$= 14 : 6 : 28 : 30$.
$\therefore t_A : t_B : t_C : t_D = 2 : \frac{1}{2} : 2 : 3$.
$\frac{t_B}{t_D} = \frac{\frac{1}{2}}{3} = \frac{1}{6}$.
$\therefore t_D = 6 \times t_B = 6 \times 2 = 12$ years.
Hence, [3].

QA-1.7 | MEANS AND WEIGHTED AVERAGES

PRACTICE EXERCISE 1

1. Arranging in ascending order,
21, 25, 25, 25, 26, 27, 28, 28, 29, 30
The number 25 appears 3 times
$\therefore$ The mode is 25
The median is $\frac{26 + 27}{2} = 26.5$
Hence, [2].

2. $(GM) = \sqrt{AM \times HM}$
$\therefore HM = \frac{(GM)^2}{AM} = \frac{6^2}{8} = 4.5$
Hence, [3].

3. Let the two numbers be a & b.
$\therefore$ Harmonic mean $= \frac{2ab}{a + b}$ and
Geometric mean $= \sqrt{ab}$
$\text{Ratio} = \frac{HM}{GM} = \frac{2ab}{a + b} \times \frac{1}{\sqrt{ab}} = \frac{12}{13}$
$\therefore \frac{2\sqrt{ab}}{a + b} = \frac{12}{13}$
$\therefore \frac{\sqrt{ab}}{a + b} = \frac{6}{13}$
Using option [3] we get a = 4 & b = 9
$\therefore LHS = \frac{\sqrt{ab}}{a + b} = \frac{\sqrt{4 \times 9}}{4 + 9} = \frac{6}{13} = RHS$. Hence, [3].

4. Although the number of students in group D is more than in any other group, we still cannot say anything about the average weight of this group as nothing is mentioned about the average weights of any of the groups or of individual students. Hence, [4].

5. Although one student is shifted from group A to group B, the number of students in the class and the total weight of the students remain the same. Therefore, the average weight of the class remains the same Hence, [3].

6. The total weight of any group will vary according to the number of students in that group. Hence, the total weight of group A and C which has (15 + 25) = 40 will be twice that of students in group B which has 20 students. However, it is clear that if all the students are of same weight, then the average weight of all groups remains same irrespective of how many students are present in each group. Hence, clearly the statement 3 is false. Hence, [3].

7. Total marks scored by the student in 10 papers = (80 × 10) = 800. If we exclude the papers in which he scored the highest and the lowest marks, then the total marks scored by him in remaining 8 papers = (81 × 8) = 648. Hence, his total in these two papers in which he scored the highest and the lowest marks = (800 – 648) = 152. Since his highest is 92, his lowest will be 152 – 92 = 60. Hence, [2].

8. Let x be the total number of students and S be the sum of scores of all the students excluding the highest score. Average marks lost = 13, therefore, average marks scored = 7.
Therefore,
S = 7(x – 1)
Minimum marks lost by any student is 3. Therefore, the highest score = 17.
Therefore,
S + 17 = 8x
Eliminating S, we have
7x + 10 = 8x
Therefore, x = 10.
Hence, [4].

9. Let the numbers be A, A+1, A+2, and so on.
Therefore, (5A+10)/5 = A + 2 = n
and (7A + 21)/7 = A + 3 = n + 1. Hence, [2].

10. Let the three numbers be a, b and 15 such that a is the smallest and 15 is the largest.
$\therefore b = \frac{a + 15}{2}$, i.e., a + 15 = 2b ..... (1)
It is also given that a + b = 15 ..... (2)
$\Rightarrow$ b = 10 and a = 5. Hence, [1].

11. Here, n = 20, $\bar{x} = 65$
$\bar{x} = \frac{\sum xi}{n} \Rightarrow \sum xi = \bar{x}.n = 20 \times 65 = 1300$
$\therefore$ Correct = (Incorrect Σdi) – (Incorrect values) + (Correct values)
= 1300 – 96 + 69 = 1273
Correct Mean $= \frac{1273}{20} = 63.65$.
Hence, [1].

12. (10b + a) – (10a + b) = 1.8 × 10. So b – a = 2.
Hence, [2].

13. The total marks of 60 students = 60 × 90 = 5400
The total marks of 55 students = 55 × 85 = 4675
Total of top 5 students = 725
The second highest is < 140 i.e $\leq$ 139
($\because$ the marks are integers)
If x is the top score, then
$725 \leq x + 139 + 139 + 139 + 139$
$725 \leq x + 556$

$\Rightarrow x \geq 169$
$\therefore$ minimum score of the topper can be 169.
Hence, [2].

14. Average marks in 3 subjects = 48
Out of these, I got 64 in one subject.
So in the other two subjects, I must have scored $48 \times 3 - 64 = 80$
For minimum number of subjects in which I failed, I need to score minimum 70 marks ($2 \times 35 = 70$) in these subjects.
But since I have scored 80 I can pass in these 3 subjects.
Now, average of all 7 subjects = 40
$\therefore$ Average of the other 4 subjects

$= \frac{7 \times 40 - 3 \times 48}{4} = 34$

For minimum number of subjects, I must have failed only in one subject and passed in the other three subjects. Hence, [1].

15. Let the actual marks be 5x, 6x, 7x and 8x. Out of these only 5x and 8x could be equal to 80.
But if 5x = 80, then x = 16 and 7x = 112 which is not possible.
$\therefore$ 8x = 80 and x = 10.
Hence the actual marks are 50, 60, 70 and 80 and the average is 65. Hence, [1].

16. 24 men contribute Rs.480.
Let the contribution of 'X' be Rs.k.

$\therefore 2\left(\frac{480 + k}{25}\right) + 3 = k$

$\therefore 960 + 2k + 75 = 25k$
$\therefore 1035 = 23k$
$\therefore \frac{1035}{23} = k \qquad \therefore k = Rs.45$

$\therefore 480 + k = 480 + 45 = Rs.525$. Hence, [2].

17. Increase after 5 years should have been $7 \times 5 = 35$ years. But since the average remains the same, difference in their age is 35 years. Hence, [2].

18. Total weight increases by $10 \times 1.5 = 15$ kg
$\therefore$ Weight of the new man = 68 + 15 = 83 kg
Hence, [4].

19. Consider a set of three numbers a, b and c

I. $AM = \frac{a + b + c}{3}$

Thus, a + b + c = 3AM. But $GM = \sqrt[3]{abc}$ which cannot be found out. Thus, I is false.

II. $AM = \frac{a + b + c}{3}$

$\therefore$ Sum of the numbers = a + b + c = 3AM.
Thus, II is true.

III. $GM = \sqrt[3]{abc}$.

But $AM = \frac{a + b + c}{3}$ which cannot be found out.

Thus, III is false.

Hence, [2].

20. I. Average of a set of numbers is greater than the smallest and smaller than the greatest number of the set. Thus, I is true.

II. Consider five numbers a, b, c, d and e whose average is $\frac{a + b + c + d + e}{5}$.

Now if each of them is increased by k then we have average

$= \frac{a+k+b+k+c+k+d+k+e+k}{5}$

$= \frac{a + b + c + d + e}{5} + \frac{5k}{5}$ = old average + k.

Thus, II is true.

III. Consider three numbers x, y and z whose average is $\frac{x + y + z}{3}$.

Now if each of them is multiplied by m then the new average $= \frac{xm + ym + zm}{3}$

$= m\left(\frac{x + y + z}{3}\right)$ = m × old average.

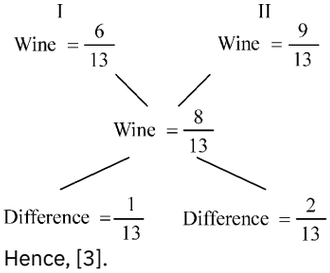
Thus, III is true.
Hence, [4].

PRACTICE EXERCISE 2

1. Average wage $= \frac{15 \times 20 + 20 \times 35 + 17 \times 25}{15 + 20 + 17}$
= Rs 27.4.
Hence, [4].

2. Ratio $= \frac{\text{Ratio of 2nd} - \text{Ratio of mixture}}{\text{Ratio of mixture} - \text{Ratio of 1st}}$ (formula)

$= \frac{\frac{1}{13}}{\frac{2}{13}} = \frac{1}{13} : \frac{2}{13} = 1 : 2$ i.e.,



Hence, [3].

3.

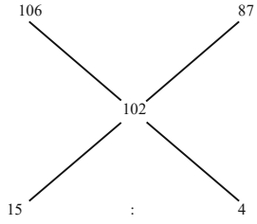
	(Number)	(Avg.Weight)	Total Weight
	f_i	x_i	xf_i
Men	30	60	1800
Women	25	50	1250
Children	15	40	600
Total	70		3650

$\therefore$ Average weight of all = $\frac{\Sigma x_i f_i}{f_i}$

$= \frac{3650}{70} \approx 52.14.$

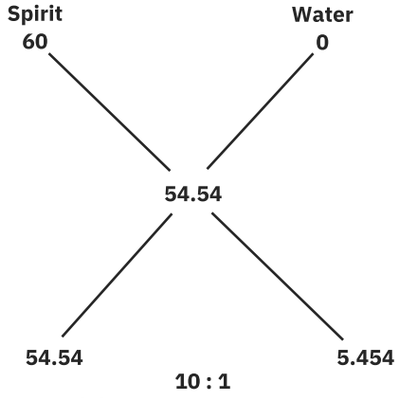
Hence, [1].

4. Let the cost price of tea be Rs.100. Then



$\therefore$ The required quantity is $\frac{15}{19} \times 380 = 300$ kg.
Hence, [2].

5. Since his SP of (spirit + water) = Rs.75/litre and he ultimately makes a profit of 37.5%, his CP of (spirit + water) = 75/1.375 = Rs.54.54. This should indeed be the weighted average of the costs of spirit and water. So if we alligate, we can get the ratio of spirit : water (assuming that cost of water is 0).



Hence, [2].

6. Let there be 12 L in Container 1 and Container 2 each.

Container 1: 12 L	Container 2: 12 L
A = 10 L	A = 3 L
B = 2 L	B = 9 L

Suppose the 2 containers get mixed in the ratio x : y.
Therefore, quantity of A = 10x + 3y and quantity of B = 2x + 9y

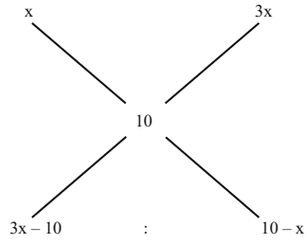
In order for A : B to be 1 : 1, $\frac{10x + 3y}{2x + 9y} = 1$

On solving, we get 8x = 6y or X : Y = 3 : 4
Hence, [4].

7. Let him mix 3 kg, 4 kg and 5 kg of dry fruits at Rs. 100, Rs. 80 and at Rs. 60 per kilogram respectively. Hence, his effective cost of the dry fruits per kilogram should be the weighted average
$= (3 \times 100 + 4 \times 80 + 5 \times 60)/(3 + 4 + 5)$
$= \frac{920}{12}$.
In order to make a profit of 50%, $\frac{920}{12} \times 1.5 = Rs\ 115$/kg.
Hence, [4].

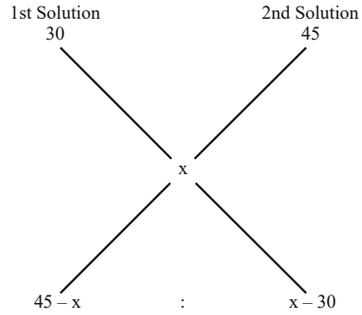
8. The cost of mixture = $\frac{18 \times 100}{180}$ = Rs.10 per kg.

Ratio of mixing the cheap and dear types = 5 : 1



$\frac{3x - 10}{10 - x} = \frac{5}{1}$
$\Rightarrow 3x - 10 = 50 - 5x$
$\Rightarrow x = Rs.7.5.$
Hence, [2].

9.



$\therefore \frac{45 - x}{1} = \frac{x - 30}{2}$

$\therefore 90 - 2x = x - 30$
$\therefore x = 40.$
Hence, [2].

10. 40 × 0.75 = 30 % of men earn > 25,000 a year. So percentage of women earning > 25,000
= 45 – 30 = 15%.
Total percentage of women = 60%.
So fraction earning > 25000 = $\frac{15}{60} = \frac{1}{4}$.
Hence, [2].

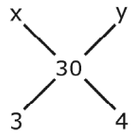
11. Let the capacity of each cup be 100 ml. So 300 ml of alcohol is taken out from the first container and poured into the second one. So the first vessel will have 200 ml of alcohol and the second one will have 500 ml of water and 300 ml of alcohol. So the ratio of water to alcohol in the second vessel is 5 : 3. Hence, proportion of alcohol in B = 3 : 8. Now if 300 ml of mixture is removed from the second container, it will have 300 × $\frac{5}{8}$ = 187.5 ml of water and 300 × $\frac{3}{8}$ = 112.5 ml of alcohol. Now if this mixture is poured in the second vessel, that vessel would have (200 + 112.5) = 312.5 ml of alcohol and 187.5 ml of water. Hence, ratio of alcohol to water in this container = 312.5 : 187.5 = 5 : 3. Hence, proportion of water = A = 3 : 8.
Therefore, we find that A = B.
Hence, [3].
Note: In any case, the amount of water in the first container will be equal to the amount of alcohol in the second container. Thus, their proportions in the two containers will be equal.

12. Glucose on being sweetened by 100 times will have a sweetness of 74. Let x be the amount of sucrose (to the nearest gram) added to 1 gram of saccharin
$\therefore (1 \times 675 + x \times 1)/(1 + x) \geq 74. \Rightarrow 73x \leq 601$
Solving, we get x = 8 (since x has to be an integer).
Hence, [2].

13. 1 g of glucose, 2 g of sucrose and 3 g of fructose will have a sweetness of (1*0.74 + 2*1 + 3*1.7) / 6 = 1.3.
Hence, [1].

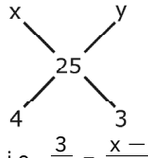
14. Let the no. of students in classes be x, y, z respectively then.
83x + 76y = 79 (x + y)
$\Rightarrow$ 4x – 3y = 0
$\Rightarrow$ x : y = 3 : 4 and
76y + 85z = 81 (y + z)
$\Rightarrow$ 5y – 4z = 0
y : z = 4 : 5.
Hence, x : y : z = 3 : 4 : 5
$\Rightarrow$ x = 3k, y = 4k and z = 5k.
Now, average for all the three classes is
(83 × 3k + 76 × 4k + 85 × 5k)/(3k + 4k + 5k) = 81.5.
Hence, [2].

15. Let mixtures A and B contain x% and y% alcohol, respectively.
Then by alligation rule, we get,



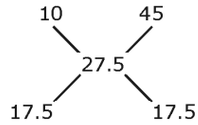
i.e., $\frac{4}{3} = \frac{x-30}{30-y}$

i.e., 3x + 4y = 210 ....(i)
and



i.e., $\frac{3}{4} = \frac{x-25}{25-y}$

i.e., 4x + 3y = 175 ....(ii)
Solving the equations (i) and (ii), simultaneously, we get, y = 45 and
x = 10.
Now again by alligation rule,



i.e., To get mixture with 27.5% alcohol, mixtures A and B need to be mixed in the ratio 1 : 1.
Hence, [4].

16. Suppose the volume of pure milk = x litres
$\therefore$ Water added = 0.2x litres
$\therefore$ His CP = Rs.10x; Fine = Rs.200; His SP = 10(x + 0.2x) = 12x
$\therefore$ (10x + 200) – 12x = 100
x = 50 litres
Volume of the mixture he sold = 1.2x = 1.2 × 50 = 60 litres. Hence, [4].

17. Let the capacity of the bucket be 'a' litre.
$\therefore \left(\frac{a-7}{a}\right)^2 = \frac{25}{36}$
$\therefore \frac{a-7}{a} = \pm\frac{5}{6}$
$\therefore$ a = 42 litre or $\frac{42}{11}$ litre.
But a > 7 litre $\Rightarrow$ a = 42 litre.
Hence, [1].

18. If x litre of soda was stolen then
$\frac{5-x}{3+x} = \frac{9}{7}$
$\Rightarrow$ 35 – 7x = 27 + 9x
$\Rightarrow$ 16x = 8
$\Rightarrow$ x = 0.5 litre.
Hence, [1].

19. Variant I : $A_1 = \frac{3}{4}B_1$, $D_1 = 2A_1$, $C_1 = \frac{7}{4}B_1$

$\therefore \frac{A_1}{C_1} = \frac{3}{7}$

Variant II : $\frac{A_2}{C_2} = \frac{A_1 + 10}{C_2} = \frac{5}{7}$

Also, $C_1 = C_2$

$\therefore \frac{3}{7} + \frac{10}{C_2} = \frac{5}{7} \Rightarrow C_2 = 35$ gms.

$\therefore A_1 = 15$ gms.
$\therefore$ Quantity of D in one unit of variant I is $2 \times 15 = 30$ gms.
Hence, [1].
Alternatively,
Let quantity of B in variant I be x gm.
So, $A_1 = \frac{3x}{4}$ and $C_1 = \frac{7x}{4}$ and $D_1 = \frac{3x}{2}$.
Quantity of C in variant II = $\frac{7}{5}A_2$
and $A_2 = A_1 + 10 = \frac{3x}{4} + 10$
$\therefore C_1 = \frac{7}{5}A_2$

$\therefore \frac{7x}{4} = \frac{7}{5}\left(\frac{3x}{4} + 10\right)$

$\therefore \frac{7x}{4} = \frac{21x}{20} + 14$

$\therefore x = 20$

$\therefore$ Quantity of D = $\frac{3}{2} \times 20 = 30$ gm.

20. $W_I \equiv$ Average weight of Section I
$W_{II} \equiv$ Average weight of section II
$W_I + W_{II} = 90$ where $W_I < W_{II}$
Let weight of Deepak and Ponam be D and P kgs respectively

Then $\frac{50 \times W_I + D - P}{50} = W_{II}$

and $\frac{50 \times W_{II} - D + P}{50} = W_I$

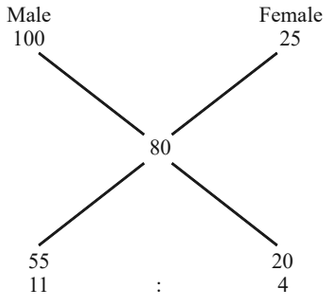
$\Rightarrow 50(W_{II} - W_I) = D - P$
Using Statement A alone:
$50 \times 1 = D - P$ .... (i)
Thus D and P can take various values
So, Statement A alone is not sufficient.
Using Statement B alone:

$\frac{50 \times W_I + D}{51} = \frac{50W_{II} - D}{49}$ .... (ii)

Since values of W_I and W_{II} are not known
We cannot find the value of D
Combining both the statements,
values of W_I and W_{II} can be found and hence value of D and P can be found, using (i) and (ii).
Hence, [3].

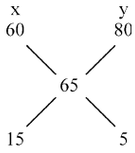
PRACTICE EXERCISE 3

1.



Now $11x + 4x = 45$
$\therefore x = 3$
$\therefore$ number of female labourers per day
$= 4 \times 3 = 12$.
Hence, [3].
Alternatively,
Let x, y be the number of male and female labourers employed by the company.
From the given conditions,
$\therefore 100x + 25y = 80(x + y)$
and $x + y = 45$
Solving the above equations, we get $y = 12$.
Hence, [3].

2.



Ratio = 3 : 1

$\therefore$ Number of girls = $\frac{1}{(3+1)} \times 400 = 100$. Hence, [1].

3. Let 15 kg of alloy A and 5 kg of alloy B be mixed.
Alloy A can have either 6 kg iron and 9 kg copper or 9 kg iron and 6 kg copper.
Alloy B can have either 4 kg copper and 1 kg zinc or 1 kg copper and 4 kg zinc.
$\therefore$ The different possibilities of the amount of iron copper and zinc in the final mixture is as follows.

Possibility	Iron	Copper	Zinc	%age of Copper
1	6	9 + 4 = 13	1	$\frac{13}{20} \times 100 = 65\%$
2	6	9 + 1 = 10	4	$\frac{10}{20} \times 100 = 50\%$
3	9	6 + 4 = 10	1	$\frac{10}{20} \times 100 = 50\%$
4	9	6 + 1 = 7	4	$\frac{7}{20} \times 100 = 35\%$

Hence, [2].

4. Let the cost price per kg of Tur dal, Masoor dal, Chana dal and Urad dal be t, m, c and u respectively.
$\therefore$ t + 2m + 3u = 35 × 6 = 210
Also, m + 2c + 2u = 43 × 5 = 215
Adding the two equations, we get t + 3m + 2c + 5u = 425
$\therefore$ Required answer = $\frac{425}{1+3+2+5}$ = Rs. 38.63
Hence [3].

5. Let the ages of the professor and assistant professor be 'p' and 'a' respectively.
Let the average age of a student be 'x' and let the total number of students in the class be 'n'.
$\therefore$ p + a + nx = 17(n + 2) ... (I)
Also, $\frac{p+a}{2} - x = n + 2$
$\therefore$ p + a – 2x = 2n + 4 ... (II)
Subtracting (II) from (I), we get nx + 2x = 15n + 30
$\therefore$ x(n + 2) = 15(n + 2)
$\therefore$ x = 15
Therefore, the required answer is 15 years.
Hence [2].

6. Let the present ages of the man, his wife, their son and their daughter be 'm' years, 'w' years, 's' years and 'd' years respectively.
10 years ago, $\frac{(m-10)+(w-10)}{2} = 25$
$\therefore$ m + w = 70
5 years ago, $\frac{(m-5)+(w-5)+(s-5)}{3} = 21$
$\therefore$ 70 – 10 + s – 5 = 63
$\therefore$ s = 8
At present, $\frac{m+w+s+d}{4} = 20$
$\therefore$ d = 80 – 70 – 8 = 2
$\therefore$ Required age difference = 8 – 2 = 6 years.
Hence [3].

7. Let the average of the seven men be x
$\therefore x = \frac{10 \times 6 + (x+3)}{7}$
60 + x + 3 = 7x
$x = \frac{63}{6} = 10.5$
$\therefore$ Total amount = 10.5 × 7 = 73.5. Hence, [1].

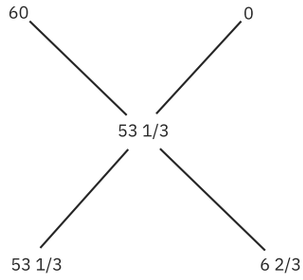
8. Total age = 15 × 36
After the two left, total age = 15 × 36 – 2 × 28
= 540 – 56 = 484 years.
Let the age of the person who returns be x years.
Then new average = $\frac{484+x}{14}$
Now x lies between 20 and 36 (both inclusive)
$\therefore$ (New average) min = $\frac{484+20}{14} = \frac{504}{14}$ = 36 years.
And (New average) max = $\frac{484+56}{14} = \frac{540}{14}$
= 38.57 years. Hence, [2].

9. Total age of the group = 49 × 20 = 980.
After two women leave and three join, the average remains unchanged.
Let total age of three women be x.
$\frac{(49 \times 20) - (45+50) + x}{21} = 49$
$\therefore$ x = 144
$\therefore$ Average = $\frac{144}{3}$ = 48 years.
Hence, [4].
Alternatively,
The two women had total age equal to 95 which is 3 less than the average contribution. So the 3 women who joined should also have total contribution 3 less than their average contribution. Hence, their average is less than the average of the group by $\frac{3}{3} = 1$
$\therefore$ average age of the 3 women
= 49 – 1 = 48 years.

10. Let the total number of employees be 12x.
$\therefore$ Number of men = 7x and number of women = 5x.
$\therefore$ Number of male managers = 20% of 7x = 1.4x and number of female managers = 35% of 5x = 1.75x
$\therefore$ Total managers = 1.4x + 1.75x = 3.15x
$\therefore$ Required percentage = $\frac{3.15}{12} \times 100 = 26.25\%$
Hence [2].

11. Quantity of wheat in 400 kg of mixture
= 0.6 × 400 = 240 kg
Quantity of barley = 400 – 240 = 160 kg
Let, x kg of barley be added to 400 kg of the mixture
$\frac{240}{160+x} = \frac{53\frac{1}{3}}{46\frac{2}{3}} = \frac{160}{140} = \frac{8}{7}$
$\therefore$ 240 × 7 = 8 × 160 + 8x
$\therefore$ x = 50 kg.
Hence, [2].

Alternatively,
We can alligate on the % of wheat in the two mixtures.
In the mixture of wheat and barley, wheat = 60%
In barley, wheat = 0%



$= \frac{160}{3}$ $= \frac{20}{3}$

Required ratio = $\frac{160}{3} : \frac{20}{3} = 8 : 1$

Amount of barley = $\frac{1}{8} \times 400 = 50$ quintals.

12. If the capacity is 12x, the cask contains 7x of A and 5x of B.
When 9 gallons are drawn off, it contains

$\left(7x - \frac{7}{12} \times 9\right)$ of A and $\left(5x - \frac{5}{12} \times 9\right)$ of B.

When 9 gallons of B are added, the cask contains

$\left(7x - \frac{21}{4}\right)$ of A and $\left(5x - \frac{15}{4} + 9\right)$ of B.

$\therefore \frac{7x - \frac{21}{4}}{5x - \frac{15}{4} + 9} = \frac{7}{9}$

This ratio is 7 : 9. $\therefore$ x = 3
Capacity = 12x = 36 gallons. Hence, [1].

13. Let the quantity of wine be a, i.e., the capacity of the cask be 'a'

i.e., $\frac{\text{Quantity of wine}}{\text{Quantity of water}} = \frac{\left(1 - \frac{5}{a}\right)^2}{1 - \left(1 - \frac{5}{a}\right)^2}$

$\frac{361}{39} = \frac{\left(1 - \frac{5}{a}\right)^2}{1 - \left(1 - \frac{5}{a}\right)^2}$;

$\frac{361}{39} - \frac{361}{39}\left(1 - \frac{5}{a}\right)^2 = \left(1 - \frac{5}{a}\right)^2$

$\left(1 - \frac{5}{a}\right) = \sqrt{\frac{361}{400}} = \frac{19}{20}$; $\frac{5}{a} = \frac{1}{20}$

$\therefore$ a = 100 litres.
Hence, [3].

Alternatively,
Let the capacity of cask be 'a'.
After the first draw, quantity of wine left =a – 5.

$\therefore \frac{\text{Quantity of wine}}{\text{Quantity of water}} = \frac{a - 5}{a}$

After the second draw, the ratio will be,

$\left(\frac{a - 5}{a}\right)^2 = \frac{361}{361 + 39} = \frac{361}{400}$

$\therefore \frac{a - 5}{a} = \frac{19}{20}$

$\therefore$ a = 100 litres

14.

	Milk	Water	Total
Initial Volume (in litre)	10	4	14
Volume after boiling (in litre)	10	$3 + \frac{1}{2}$	$10 + \frac{7}{2}$

$\therefore$ The required proportion is $\frac{10}{10 + \frac{7}{2}} = \frac{20}{27}$.
Hence, [3].

15.

	Alcohol	Grape juice	Alcohol : Grape
Tank 1	20%	80%	1 : 4
Tank 2	40%	60%	2 : 3

The ratio of grape juice to alcohol in half filled wine glass = $\frac{2 \times \frac{4}{5} + 3 \times \frac{3}{5}}{2 \times \frac{1}{5} + 3 \times \frac{2}{5}} = \frac{17}{8}$

So, the half capacity of the glass = 17 + 8 = 25
So, full capacity = 25 × 2 = 50
Now rest 25 parts has to be filled with alcohol.
So the ratio of the grape juice to alcohol
= 17 : (8 + 25) = 17 : 33.
Hence, [4].
Alternatively,
As the wine glass is filled to half by taking two parts from tank 1 and three parts from tank 2 and the second half is equivalent to five parts which is pure alcholol, the percentage concentration of grape juice is:

$\frac{2 \times 80 + 3 \times 60 + 5 \times 0}{2 + 3 + 5} = 34\%$.

Therefore, the ratio of grape juice to alcholol is 34 : 66 = 17 : 33.

16. The order of measures is A, B, C, A + B, B + C, C + A, A + B + C.
Given A + B + C = 180
Hence, average of the 7 measures =

$\left[\frac{(A) + (B) + (C) + (A + B) + (B + C) + (C + A) + (A + B + C)}{7}\right]$

$= \frac{4}{7}(A + B + C) = \frac{4}{7} \times 180 = \frac{720}{7}$ kgs.
Hence, [3].

17. In 240 litres of adulterated milk, amount of pure milk is 225 litres and amount of water is 15 litres.
$\therefore$ He is selling 240 litres for the cost of 225 litres.

$\therefore$ Profit percent $= \frac{240 - 225}{225} \times 100 = \frac{15}{225} \times 100$
$= \frac{1}{15} \times 100.$

Since profit percent needs to be halved, the profit percent should be $\frac{1}{30} \times 100.$

Let the amount of pure milk to be added be x.

$\therefore \frac{15}{225 + x} \times 100 = \frac{1}{30} \times 100$

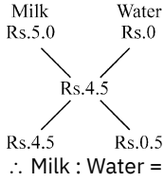
$\therefore$ x = 225 litres
Hence, [3].
Alternatively,
If water is mixed into pure milk, the profit % is equal to the % of water in the mixture as water is obtained at free of cost.
To have the profit %, the % of water is to be halved in the mixture.
This can be achieved by doubling the amount of milk as the amount of water is not changed.

In this case, amount of water $= \frac{1}{1 + 15} \times 240 = 15$ litres
$\therefore$ Amount of milk = 240 – 15 = 225 litres.
To have the % profit 225 litres of milk should be added to the mixture.

18. Cost price of milk = Rs.5/litre

Cost price of mixture $= \frac{100}{133\frac{1}{3}} \times 6 =$ Rs.4.5/litre

$\therefore \frac{\text{Quantity of water}}{\text{Quantity of milk}} = \frac{5 - 4.5}{4.5 - 0} = \frac{0.5}{4.5} = \frac{1}{9}$ i.e.,



$\therefore$ Milk : Water = 9 : 1.
Hence, [1].

19. Let the number that has not been considered be p.

$\therefore \frac{\frac{n(n+1)}{2} - p}{n-1} = 12\frac{9}{23} = \frac{285}{23}$

n – 1 could be 23 or a multiple of 23.
Let n – 1 = 23 $\therefore$ n = 24

$\therefore \frac{24(25)}{2} - p = 285$ $\therefore 300 - p = 285 \Rightarrow p = 15.$

Hence, [2].

20. Stage $\frac{\text{Wine left}}{\text{Original quantity}}$

0 $\frac{10}{10}$

1 $\frac{8}{10}$

2 $\frac{8}{10} \times \frac{6}{10}$

3 $\frac{8}{10} \times \frac{6}{10} \times \frac{4}{10}$

4 $\frac{8}{10} \times \frac{6}{10} \times \frac{4}{10} \times \frac{2}{10} \Rightarrow \frac{4 \times 3 \times 2 \times 1}{5^4} = \frac{4!}{5^4}$

$\therefore \frac{\text{Wine}}{\text{Water}} = \frac{\frac{4!}{5^4}}{1 - \frac{4!}{5^4}} = \frac{4!}{5^4 - 4!}$

Hence, [2].

Data Interpretation
&
Logical Reasoning

DI-1.1 | BASICS OF DATA INTERPRETATION

PRACTICE EXERCISE 1

Answers to questions 1 to 4:

Since D was ranked I in round 4, his amount in round 3 should have been $\frac{1}{4}$ × 1024 = 256. Since C was ranked II in round 4, his amount in round 3 should have been $\frac{1}{2}$ = 512

Since B was ranked III in round 4, his amount in round 3 would have remained as 1024.
Since A was ranked IV in round 4, his amount in round 3 should have been 1024 + (1024 – 256) + (1024 – 512) = 2304
We can do similar back calculations and find out how much each person had at the end of each round as follows:

	Amount with each person			
Round	A	B	C	D
4	1024	1024	1024	1024
3	2304	1024	512	256
2	2304	512	128	1152
1	1152	128	1664	1152
Initially	288	1568	1664	576

Using this, all the questions can be answered.

1. Hence, [1].
2. Hence, [2].
3. Hence, [1].
4. Hence, [4].

Answers to questions 5 to 8:
The robot can take the following paths:

Sr. No	Path	Number of components carried
1	A-B-E-G	460
2	A-B-E-F-G	560
3	A-B-F-G	420
4	A-B-D-F-G	500
5	A-B-D-E-G	540
6	A-B-D-E-F-G	640
7	C-A-B-E-G	530
8	C-A-B-E-F-G	630
9	C-A-B-F-G	490
10	C-A-B-D-F-G	570
11	C-A-B-D-E-G	610
12	C-A-B-D-E-F-G	710
13	C-D-F-G	400
14	C-D-E-G	440
15	C-D-E-F-G	540

5. It can be seen that the robot carries fewer than or equal to 550 machine components along paths numbered 1, 3, 4, 5, 7, 9, 13, 14, and 15. Therefore, the required answer is 9.

6. It can be seen that the robot visits all the 7 storage locations along path 12 and carries 710 machine components and visits only 4 locations along the path 13 and carries 400 components. Therefore, the required answer is 710 - 400 = 310.

7. It can be seen that the robot carries exactly 540 components along paths 5 and 15. Therefore, the required answer is 2.

8. From the table, we can see that path number 8 is the path through which maximum number of components (630) can be carried such that it doesn't involve the path between B and D. Therefore, the required answer is 630.

Answers to questions 9 to 12:

Genre	Total	Number of books English language as % of total	English books	Marathi
Fiction	6000	50	3000	3000
Novels	2100	80	1680	420
Biographies	1800	70	1260	540
Autobiographies	3500	80	2800	700
Dramatics				
Poetry	x			
Philosophy	5200 - x	70(from 5)		
Total				

Let x = number of books on poetry.
Then number of books on philosophy = 2 × 3500 – (x + 1800) by condition 3 i.e. 5200 – x

Then total number of Marathi books on poetry = $\frac{10x}{100}$ by condition 6

By condition 5, Number of English books on philosophy = 70 × $\frac{(5200 - x)}{100}$

So, Number of Marathi books on philosophy = 30 × $\frac{(5200 - x)}{100}$ = 10 × $\frac{10x}{100}$ by condition 2

Solving the equation x = 1200 and 5200 – x = 4000

We update the table as follows.

Genre	Total	Number of books English language as % of total	English books	Marathi
Fiction	6000	50	3000	3000
Novels	2100	80	1680	420
Biographies	1800	70	1260	540
Autobiographies	3500	80	2800	700
Dramatics				
Poetry	1200	90	1080	120
Philosophy	4000	70	2800	1200
Total				

9. Hence [4]

10. The total number of books on Dramatics cannot exceed 6000 and the number of Marathi books on Dramatics cannot exceed 50% of 6000, that is, 3000. Hence, [2].

11. From the updated table, statement I is clearly true.

The sum of total number of Marathi books other than those on Dramatics is 5980. Hence by condition 1, statement II is also true.

Hence, [3].

12. Let x be the number of books on dramatics, then y = 18600 + x.

Now $4000 < x < 6000$

And ratio increases as x increases.

Thus min possible ratio = 4000 : 22600 = $\frac{20}{113}$ and

max possible ratio is 6000 : 24600 = $\frac{30}{123} > \frac{30}{150} = \frac{1}{5}$

hence option [1] and [4] may not hold

Max possible ratio = $\frac{30}{123} < \frac{30}{120} = \frac{1}{4}$

Option [2] is clearly not true as maximum possible ratio is $< \frac{1}{4}$

Hence [3].

Answers to questions 13 to 16:

Suppose the sales of the company in 2017 was '100x' and the expenses of the company in 2017 was '100y'. Therefore we have the following:

Region	Sales	Expense
North	30x	28y
East	20x	21y
West	25x	25y
South	15x	17y
North-East	10x	9y

Since the company suffered losses in all the five regions of India in 2017, expenses in all the regions must have been greater than the sales in all the regions.

North: $28y > 30x$ or $y > \frac{30}{28}x$ or $y > 1.07x$

East: $21y > 20x$ or $y > \frac{20}{21}$ or $y > 0.952x$

West: $25y > 25x$ or $y > x$

South: $17y > 15x$ or $y > \frac{15}{17}x$ or $y > 0.8823x$

North-East: $9y > 10x$ or $y > \frac{10}{9}$ or $y > 1.1111x$

This means that if y increases above 0.8823x, the company suffers a loss in South. If y further increases and exceeds 0.952x, the company suffers a loss in East. If y further increases and exceeds x, the company suffers a loss in West. If y further increases and exceeds 1.07x, the company suffers a loss in North. Finally if y exceeds 1.1111x, the company suffers a loss in North-East.

13. If the company suffers a loss in all the five regions of India, $y > 1.1111x$. If sales of the company in 2017 was 100, expenses must have been greater than 111.11. Therefore the minimum percent loss margin suffered by the company in India

$= \frac{111.11 - 100}{100} \times 100 = 11.11\%$.

Hence [2]

14. From the explanation given above, it can be seen that the company starts making losses in the North-East last i.e. only after y exceeds 1.1111 x. Therefore the percent loss margin made by the company in 2017 was lowest in the North-East.

Hence [3]

For A.15 and A.16

The company suffered a total loss margin of 50% in 2017. Suppose the total sales of the company in 2017 was 200. Therefore the total expense of the company in 2017 was 300.
Therefore we have,

Region	Sales	Expense	Loss	Percent Loss Margin
North	60	84	24	$\frac{24}{60} \times 100 = 40\%$
East	40	63	23	$\frac{23}{40} \times 100 = 57.50\%$
West	50	75	25	$\frac{25}{50} \times 100 = 50\%$
South	30	51	21	$\frac{21}{30} \times 100 = 70\%$
North-East	20	27	7	$\frac{7}{20} \times 100 = 35\%$
Total	200	300		

15. Hence [1]

16. It can be seen that the company suffered lowest percent loss margin in North-East in 2017. If in 2018, the sales of the company in the North-East increases to 27, there will be a situation of break-even in the North-East. Sales of the company in North-East in 2018 was 10% of total sales of the company in India. Therefore the total sales of the company in India should be $\frac{27}{0.1} = 270$.

$\therefore$ Required percent increase in the sales of the company = $\frac{270 - 200}{200} \times 100$

$= \frac{70}{200} \times 100 = 35\%$

Hence, [2]

PRACTICE EXERCISE 2

We know that the price per kg of Pineapple in 2014 was Rs. 70. Using this, the price per kg of Pineapple can be calculated for 2013, 2012 and 2011. From its price in 2011, the price per kg of the remaining fruits can be calculated for 2011. Then, their prices for the remaining years can also be calculated. Thus, we get the final table as follows:

	Price per kg in a Year			
	2011	2012	2013	2014
Apple	30	36	45	50
Mango	60	69	92	115
Pineapple	45	54	63	70
Guava	32	40	42	48
Strawberry	50	55	66	69

Using this, all the questions can be answered.

1. Required average = $\frac{32 + 40 + 42 + 48}{4}$ = 40.5. Hence [2]

2. Required percentage = $\frac{36}{50}$ × 100 = 72%. Hence [3]

3. The maximum increase in the price per kg of Strawberry was in 2013 over 2012, that is, Rs. 11. Hence [1]

4. Percent increase in price per kg in 2014 over 2011 for:
   Apple = $\frac{20}{30}$ × 100 = 66.6%
   Strawberry = $\frac{19}{50}$ × 100 = 38%
   Pineapple = $\frac{25}{45}$ × 100 = 55.5%
   Mango = $\frac{55}{60}$ × 100 = 91.6%
   Hence [4]

Answers to questions 5 to 8:
Using the information in the scatter plot, we can generate the following table (Note: Loss and % Loss are entered as negative values in the table)

	Income	Expenditure	Profit	Profit %	
FE	6	3.5	2.5	41.67%	
SE	6.5	5	1.5	23.08%	
TE	5	7.5	-2.5	-50.00%	Class A
BE	3.5	1	2.5	71.43%	
Total	21	17	4	19.05%	
FE	7	5.5	1.5	21.43%	
SE	7.5	3	4.5	60.00%	
TE	5.5	1.5	4	72.73%	Class B
BE	5	4.5	0.5	10.00%	
Total	25	14.5	10.5	42.00%	
FE	1.5	3	-1.5	-100.00%	
SE	4.5	6	-1.5	-33.33%	
TE	2	5	-3	-150.00%	Class C
BE	1	1	0	0.00%	
Total	9	15	-6	-66.67%	
FE	5	5.5	-0.5	-10.00%	
SE	1.5	7.5	-6	-400.00%	
TE	5.5	3.5	2	36.36%	Class D
BE	4	7.5	-3.5	-87.50%	
Total	16	24	-8	-50.00%	

Now all the questions can be answered.

5. It can be seen that class C is the only class that makes more than 50% loss.
   Hence [2].

6. Hence [4].

7. Total income from FE = 6 + 7 + 1.5 + 5 = 19.5 Lakhs

Total income from SE = 6.5 + 7.5 + 4.5 + 1.5 = 20 Lakhs

Total income from TE = 5 + 5.5 + 2 + 5.5 = 18 Lakhs

Total income from BE = 3.5 + 5 + 1 + 4 = 13.5 Lakhs

Therefore, the average income is lowest on BE.

Hence [4].

8. From the explanatory answer to the previous question, we know the sum total of the income of the four classes from each of the four years.

Total expenditure on FE = 3.5 + 5.5 + 3 + 5.5 = 17.5 Lakhs

Total expenditure on SE = 5 + 3 + 6 + 7.5 = 21.5 Lakhs

Total expenditure on TE = 7.5 + 1.5 + 5 + 3.5 = 17.5 Lakhs

Total expenditure on BE = 1 + 4.5 + 1 + 7.5 = 14 Lakhs

Therefore, the sum total of the income from two years is greater than the sum total of expenditure.
Hence [3].

9. Only New Zealand has never managed 3.5. All the others have, for instance England (2005), Australia (2001), India (2009), Sri Lanka (2009), Pakistan (2005), South Africa (2003), West Indies (2004). Hence [4].

10. Australia have the highest average among the given countries in 2000, 2001, 2002, 2003, 2006 and 2007, i.e. 6 times. Hence [3].

11. Only England (2009), Sri Lanka (2008 and 2009) and India (2008 and 2009) have managed to get a higher RPO than Australia in any year. Hence [3].

12. This has been achieved 20 times (Australia – 7 times, India – 4 times, South Africa – 3 times, England and Sri Lanka 2 twice each, Pakistan and New Zealand once each). Hence [3].

13. This has been achieved 16 times (Thrice each by South Africa, West Indies and New Zealand, twice each by Sri Lanka, Pakistan and England, and once by India). Hence [1].

14. During the given period, both West Indies and New Zealand have scored the lowest average 4 times each. Hence [4].

15. 4 teams i.e. England, Australia, Sri Lanka and South Africa averaged more than India in 2002. Hence [2].

16. 16 patterns were produced in red (All but a, g, m and q). Hence [3].

17. 16 patterns were produced for women in green and red (All but a, g, i, and m). Hence [2].

18. “Men, White” was produced in 17 patterns, the rest of the options in 16 patterns each. Hence [1].

19. There was excess production in 5 varieties: “Men, White”, “Men, Red”, “Women, Red”, “Children, Black”, “Children, Green”. Hence [4].

DI-1.2 | CALCULATION BASED DI

PRACTICE EXERCISE

Answers to questions 1 to 4:

Based on the graph, we can list the temperature readings for each day as follows:

Date	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr
°C	32	30	31.5	33	31	29	29.5	28	30.5

Date	10-Apr	11-Apr	12-Apr	13-Apr	14-Apr	15-Apr
°C	31	33	31.5	32	34	34.5

Using this, all questions can be answered.

1. Required average

   $= \frac{32 + 30 + 31.5 + 33 + 31 + 29 + 29.5 + 28 + 30.5 + 31 + 33 + 31.5 + 32 + 34 + 34.5}{15} = 31.37.$

   Hence, [2].

2. Maximum temperature increased consecutively for 3 days on 9-11 Apr and 13-15 Apr. Hence, [2].

3. Average of period 1 = 31.17

   Average of period 2 = 31

   Average of period 3 = 29.33

   Average of period 4 = 31.83

   Average of period 5 = 33.5

   Hence, [3].

4. The sharpest increase in the maximum temperature was recorded on 9-Apr.

   Hence, [4].

5. The number of runs scored by the batsman in 1999 = 8571 – 7728 = 843

   The number of balls faced by the batsman in 1999 = 9875 – 8924 = 951

   The number of fours hit by the batsman in 1999 = 854 – 770 = 84

   The number of sixes hit by the batsman in 1999 = 111 – 97 = 14

   Therefore, the number of runs scored by the batsman in 1999 in the form of fours and sixes = 14 × 6 + 84 × 4 = 420

   Therefore, the number of runs scored by the batsman in 1999 in the form of singles and doubles = 843 – 420 = 423.

   The number of balls faced by the batsman in 1999 in which he did not hit a four or a six = 951 – 14 – 84 = 853

   The maximum number of dot balls will be obtained when he scores most of the 423 runs in the form of doubles. He could have scored maximum 422 runs in the form of doubles or he could have faced maximum = 211 balls in which he scored two runs each. In that case, he would have scored one run in the form of a single in one ball.

   Therefore, the maximum number of dot balls = 853 – 211 – 1 = 641

   Therefore, the required answer is 641.

6. We have the following for the different two-year periods:

Year	Innings	Not out	Runs scored	Average
1993-94	87-45=42	10-4=6	2768-1360=1408	Between 30 and 40
1994-95	99-62=37	11-8=3	3212-1679=1533	Between 40 and 50
1995-96	131-87=44	13-10=3	4823-2768=2055	Greater than 50
1996-97	167-99=68	16-11=5	5834-3212=2622	Between 40 and 50
1997-98	200-131=69	20-13=7	7728-4823=2905	Between 40 and 50
1998-99	222-167=55	22-16=6	8571-5834=2737	Greater than 50

We need to compare the averages for 1995-96 and 1998-99.

The average for 1995-96: $\frac{2055}{44 - 3} = 50.12$

The average for 1998-99: $\frac{2737}{55 - 6} = 55.86$

Therefore, the average is maximum for 1998-99.

Therefore, the required answer is 1998.

7. It would help to note that we need to consider only those years for which the cumulative strike rate is higher than the previous year. It can be seen that in 1994, 1995, 1996, 1997, 1998, 1999 and 2001, the cumulative strike rate is higher than in the previous years. Therefore, we need to consider only those years for calculations.

We have,

Year	Runs scored	Balls Faced
1994	2768-1679=1089	3488-2259=1229
1995	3212-2768=444	3926-3488=438
1996	4823-3212=1611	5880-3926=1954
1997	5834-4823=1011	7070-5880=1190
1998	7728-5834=1894	8924-7070=1854
1999	8571-7728=843	9875-8924=951
2001	10803-9899=904	12489-11499=990

It can be seen that the runs scored by the batsman in 1995 and 1998 were more than the number of balls faced. Therefore, the strike rate in those two years was greater than 100. For all other years, the strike rate was less than 100.

The strike rate in 1995: $\frac{444}{438} \times 100 = 101.37$

The strike rate in 1998: $\frac{1894}{1854} \times 100 = 102.16$

Also, the cumulative strike rate in 1990 was 97.95 and the cumulative strike rate in 1991 was 81.59. Therefore, the strike rate in 1991 cannot be greater than 100.

Therefore, the required answer is 1998.

8. If we want the RPO of the batsman to be greater than 5.4, his strike rate will have to be greater than $\frac{5.4}{6} \times 100 = 90$

From the answer to the previous question, we have seen that the strike rate of the batsman in 1995 and 1998 was greater than 100. We have also calculated the number of runs scored and the number of balls faced for a few other years in the answer to the previous question. From that,

Year	Runs scored	Balls Faced	Strike rate
1994	2768-1679=1089	3488-2259=1229	$\frac{1089}{1229} \times 100 = 88.61$
1996	4823-3212=1611	5880-3926=1954	$\frac{1611}{1954} \times 100$ (< 90)
1997	5834-4823=1011	7070-5880=1190	$\frac{1011}{1190} \times 100$ (< 90)
1999	8571-7728=843	9875-8924=951	$\frac{843}{951} \times 100 = 88.64$
2001	10803-9899=904	12489-11499=990	$\frac{904}{990} \times 100 = 91.31$

We need to check for other years, namely 1989, 1990, 1991, 1992, 1993 and 2000.

In 1989, he played only one match and his strike rate was 0. By 1990, he had played 12 matches and his cumulative strike rate was 97.95. Therefore, his strike rate in 1990 was definitely greater than 90. His cumulative strike rate in 1991 was 81.59 (which was less than the lower limit) and his cumulative strike rate up-to 1993 registered a decrease every year. Therefore, his strike rate in 1991, 1992 and 1993 cannot be greater than 90.

We need to check only for the year 2000. The number of runs scored by him in 2000 = 9899 – 8571 = 1328, and the number of balls faced by him in 2000 = 11499 – 9875 = 1624. Therefore, his strike rate in 2000 = $\frac{1328}{1624} \times 100 = 81.77$, which does not lie in the required range.

Therefore, the years in which the strike rate (and hence RPO) is in the required range are 1990, 1995, 1998 and 2001.

Therefore, the required answer is 4.

9. We have,

Year	Fours hit (Cumulative)	Fours hit (in the year)	Sixes hit (Cumulative)	Sixes hit (in the year)
1989	0	0	0	0
1990	21	21- 0 = 21	6	6 – 0 =6
1991	54	54 – 21 =33	9	9 – 6 = 3
1992	104	104 – 54 = 50	10	10 – 9 = 1
1993	126	126 – 104 = 22	13	13 – 10 = 3
1994	256	256 – 126 = 130	24	24 – 13 = 11
1995	318	318 – 256 = 62	28	28 – 24 = 4
1996	481	481 – 318 = 163	45	45 – 28 = 17
1997	582	582 – 481 = 101	57	57 – 45 = 12
1998	770	770 – 582 = 188	97	97 – 57 = 40
1999	854	854 – 770 = 84	111	111 – 97 = 14
2000	997	997 – 854 = 143	124	124 – 111 = 13
2001	1113	1113 – 997 = 116	127	127 – 124 = 3

It can be seen that the batsman hit maximum number of fours as well as sixes in 1998.

Therefore, the required answer is 1998.

10. The sum of the total international trade of these 10 countries for 2012 and 2014 is simply the sum of all the entries corresponding to those two years.

Therefore total international trade in 2012 = 60 + 20 + 30 + 50 + 10 + 70 + 80 + 45 + 70 + 25 + 70 + 25 + 10 + 10 + 15 + 35 + 70 + 70 + 25 + 35 = 825

Similarly total international trade in 2014 = 80 + 50 + 80 + 45 + 45 + 30 + 50 + 30 + 20 + 55 + 75 + 25 + 65 + 30 + 15 + 40 + 65 + 80 + 15 + 20 = 915

Therefore percent increase = $\frac{915 - 825}{825} \times 100 = \frac{90}{825} \times 100$.

This is between 10% and 11%.

Hence [2]

11. Total imports in 2014 = 80 + 80 + 45 + 50 + 20 + 75 + 65 + 15 + 65 + 15 = 510 million dollars

Total imports in 2015 = 25 + 35 + 80 + 70 + 80 + 50 + 20 + 70 + 15 + 75 = 520 million dollars

Therefore the required increase = 520 – 510 = 10 million dollars

Hence [1]

12. It can be seen that no country registered a consistent increase in exports in 2013, 2014 and 2015 over the previous year.

Hence [1]

13. Trade surplus is the situation when export is greater than import. It can be seen that for all countries, export in at least one year is at least equal to or less than imports. Therefore the required answer is 0.

Hence [1]

14. Required ratio is: $\frac{600\times10,000,000}{13,000\times0.9090\times2,000}=\frac{6000}{26\times0.9090}$ = 253.87
Hence [2].

15. We have,

Company	Revenue (in Rs. Crores)	Number of employees
A	900	11000
B	600	13000
C	1600	11500
D	1800	13500
E	1100	18000

Effectively we have to compare ratios $\frac{9}{11},\frac{6}{13},\frac{16}{11.5},\frac{18}{13.5},\frac{11}{18}$. It can be seen that $\frac{9}{11}$ is between 80% and 90%, $\frac{6}{13}$ is between 40% and 50%, $\frac{16}{11.5}$ is almost 140%, $\frac{18}{13.5}$ is 133.33% and $\frac{11}{18}$ is between 60% and 70%.
Therefore the required ascending order is B-E-A-D-C
Hence [3]

16. The required ratio is: $\frac{11500\times2000\times0.9440}{13500\times2000\times0.9280}=\frac{115\times944}{135\times928}=\frac{23\times59}{27\times58}$ = 1357 : 1566
Hence [4].

17. We have the following

Company	Revenue (in Rs. Crores)	Number of employees	Efficiency ratio	Ratio
A	900	11000	94.50%	$\frac{900\times10,000,000}{11000\times2000\times0.9450}$
C	1600	11500	94.40%	$\frac{1600\times10,000,000}{11500\times2000\times0.9440}$
D	1800	13500	92.80%	$\frac{1800\times10,000,000}{13500\times2000\times0.9280}$
E	1100	18000	97.60%	$\frac{1100\times10,000,000}{18000\times2000\times0.9760}$

Effectively we have to compare the following ratios:

$\frac{9}{110\times0.9450}, \frac{16}{115\times0.9440}, \frac{18}{135\times0.9250}, \frac{11}{180\times0.9760}$ or $\frac{9}{103.56}, \frac{16}{108.56}, \frac{18}{124.875}, \frac{11}{175.68}$

or $\frac{1}{11.XX}, \frac{1}{6.XX}, \frac{1}{6.XX}, \frac{1}{15.XX}$

Clearly the required ratios for C and D are greater than that for A and E. We need to compare the ratios for C and D closely.

and $\frac{16}{108.56} = \frac{1}{6.785}$ and $\frac{18}{124.875} = \frac{1}{6.9375}$. Therefore the ratio for C is greater than the ratio for D.

Therefore the required descending order is C-D-A-E.

Hence [2].

LR-1.1 | TYPES OF ARRANGEMENTS

PRACTICE EXERCISE 1

SET 1

Answers to questions 1 to 4:

Using the information given, we can generate the following cases:

Position	Case 1	Case 2	Case 3
1	Hillary	Vladimir	Hillary
2	Vladimir	Hillary	Donald
3	Donald	Donald	Barrack
4	Barrack	Barrack	Vladimir
5	Benjamin	Benjamin	Benjamin
6	David	David	David

Now all the questions can be answered.

1. Hence [1]
2. Hence [2]
3. Hence [3]
4. Hence [4].

SET 2

Answers to questions 5 to 8:

Using the information given, we can generate the following table:

Position from the top	Colour of the cover	Number of pages	Owner of the book
1	Green	700	Ashish
5	Yellow	400	Eknath
	Indigo	600	Chandrakant
	Red	500	Dattu
	Violet	300	Bhushan

Now all the questions can be answered.

5. Hence [4]
6. Hence [2]
7. Hence [3]
8. Hence [2]

SET 3

Answers to questions 9 to 11:

Position / Horse	1	2	3	4	5	6	*Col*
A	×	×	✓	×	×	×	*Go*
B	×	✓	×	×	×	×	*Bl*
C	×	×	×	×	×	✓	*Pu*
D		×	×	×	✓	×	
E	×	×	×	✓	×	×	*Wh*
F		×	×	×		×	
Col	*Gr*	*Bl*	*Go*	*Wh*	*?*	*Pu*	

Three horses finished between F and D. So they must have been either 1st and 5th, or 2nd and 6th. But the latter alternative is impossible as B finished 2nd. So F and D finished 1st and 5th(not necessarily in that order). We also know that the horse wearing yellow finished just ahead of C and just behind E. Hence the horse in yellow cannot be in 1st or last position. It cannot be in 2nd or 4th position as these are already occupied by Blue and White respectively. It also cannot be in 3rd position as it is just behind E and we know that B is in 2nd position. Hence the yellow horse must be in 5th place, which also implies E is in 4th place (and wearing white) and C in last place. By elimination, A can only be 3rd.
Now we can proceed to answer the questions:

9. The order has to be _ B A E _ C. Of the answer choices, only (iv) F B A E D C fits this.

10. If D was in yellow, it could not be in 1st place (as 1st is in grey). Hence F must have won. Hence (ii).

11. Clearly, B, A and E finished between F and D. Hence (iii)

SET 4

Answers to questions 12 to 15:

Using the information given, we can generate the following cases:

Name	Profession	Game
Ajay	Architect	Tennis
Bhushan	Doctor	Cricket
Chandru/Dinesh	Writer	Squash
Dinesh/Chandru	Professor	Polo
Eknath	Manager	Hockey

Name	Profession	Game
Ajay	Architect	Tennis
Bhushan	Professor	Polo
Dinesh	Writer	Squash
Chandru	Doctor	Cricket
Eknath	Manager	Hockey

Now all the questions can be answered.

12. Hence [1]

13. Hence [2]

14. Hence [1]

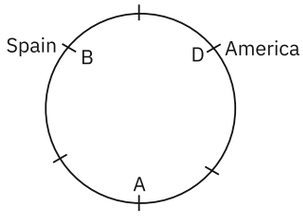
15. Hence [3]

PRACTICE EXERCISE 2

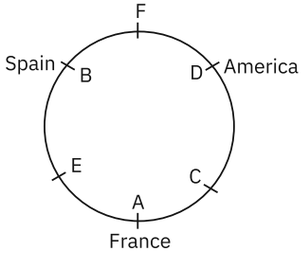
SET 1

Answers to questions 1 and 2:

From statements (6) and (3), we get



From statements (5) and (4), we get



From statement (2), we get the following possibilities:

	Possibility 1	Possibility 2	Possibility 3
F	Germany	Britain	Australia
C	Britain	Australia	Germany
E	Australia	Germany	Britain

From statement (1), men and women are sitting alternately. Therefore, C, F and E all are of the same gender.
From statement (7), if the delegate from Britain is a woman, C, F and E all are women.
Now all the questions can be answered.

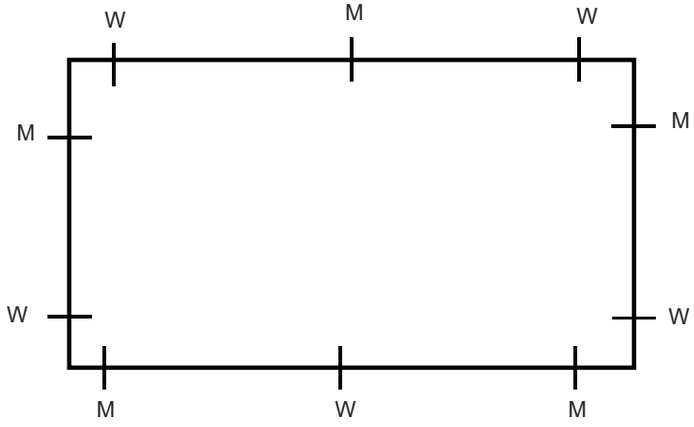
1. Therefore, the required answer is 3.

2. Therefore, the required answer is 6.

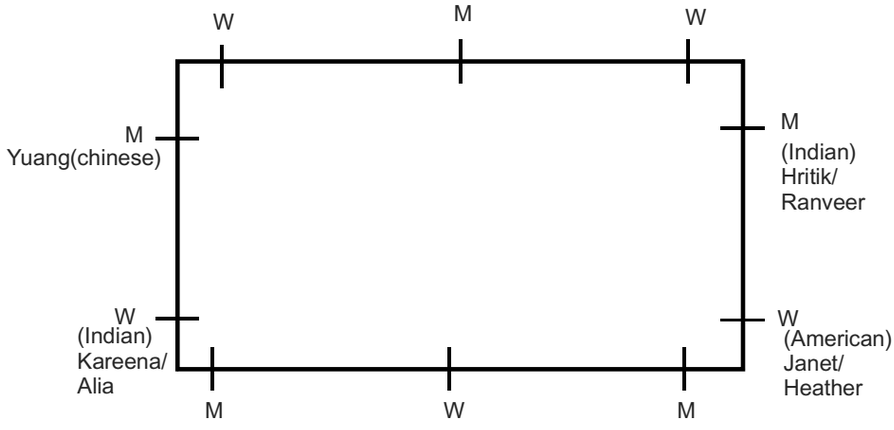
SET 2

Answers to questions 3 to 6:

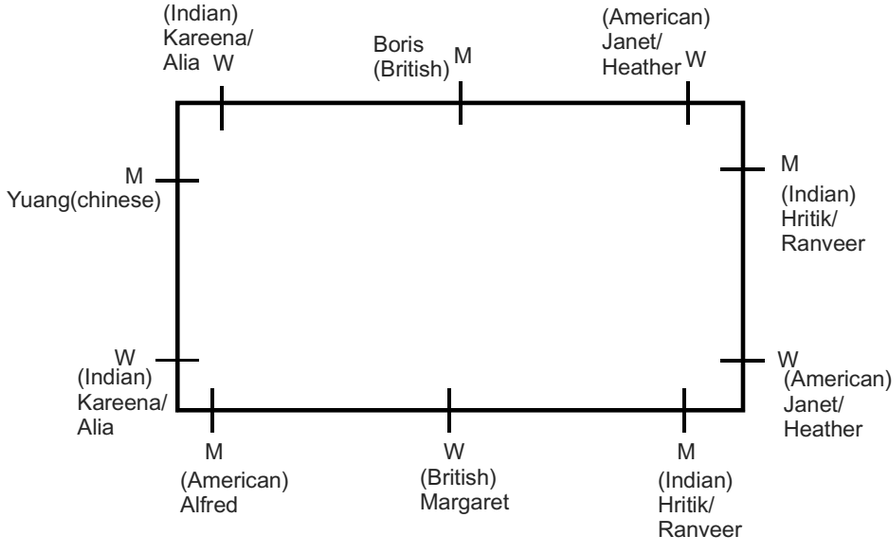
Using condition (3), we get the following.



From condition (2) and (4), we can see that exactly one Indian sits along each of the four sides of the table. From conditions (6) and (2), we get the following:



Now, one Indian, one American and one British have to be accommodated in each of the remaining sides. Using other conditions, we get the following arrangement:



Now all the questions can be answered.

3. It can be seen that Alia can be seated opposite Janet, Heather or Alfred. Hence, [3].

4. It can be seen that either Janet or Heather are seated farthest to Yuang. Hence [4]

5. It can be seen that Boris and Margaret are facing each other. Hence [1]

6. Hence [2].

SET 3

Answers to questions 7 to 10:

From statements (5) and (6), we can deduce that Tushar is from Assam, who was ranked first and has specialized in Operations. That means he is less than 25 years old.

From statement (4), Bhanu is ranked either 2nd or 3rd. That means from statements (2) and (7), Amarendra is fifth and Mandar is sixth.

From statement (8), Chandrashekhar is from Maharashtra and was ranked 2nd or 3rd.

From statement (1), Mandar is from Rajasthan and has specialized in Marketing. That means Amarendra is from Orissa and has specialized in Finance.

Therefore, from statements (2) and (3), Jayant is from Kerala and Bhanu is from Gujarat. The person ranked 3rd i.e. Bhanu or Chandrashekhar has specialized in Human Resources.

Hence we can draw the matrix as follows:

Rank	Name	Specialization	State	Age
1	Tushar	Operations	Assam	Less than 25
2	Bhanu/ Chandrashekhar	General Management	Gujarat/ Maharashtra	Less than 25
3	Chandrashekhar/ Bhanu	Human Resources	Maharashtra/ Gujarat	Less than 25
4	Jayant	Systems	Kerala	More than 25
5	Amarendra	Finance	Orissa	More than 25
6	Mandar	Marketing	Rajasthan	More than 25

Now all the questions can be answered.

7. Hence [1]

8. Hence [3]

9. Hence [3]

10. Hence [4]

SET 4

Answers to questions 11 to 14:

Information given is as follows

Name	Daughter	Institute	Profession
	Neha	A	
Prakash			Businessman
Rajesh	Neha/Gayatri	A/B/C	
Sameer		C	Businessman/Consultant/Mkt Professional
	Gayatri		Consultant
	Shweta	A/B/C	Banker/Businessman/Consultant
Tushar		A/C/L	Businessman/Consultant/Mkt Professional

Since Sameer is an alumnus of NIM-C, Prakash is a businessman and Gayatri's father is a consultant, we have

Name	Daughter	Institute	Profession
	Neha	A	
Prakash			Businessman
Rajesh	Neha/Gayatri	A/B	
Sameer		C	Consultant/Mkt Professional
	Gayatri		Consultant
	Shweta	A/B/C	Banker/Businessman
Tushar		A/ L	Consultant/Mkt Professional

It can be seen that one of Sameer and Tushar is a Consultant and the other is a Marketing Professional. Prakash is a businessman. Therefore, Rajesh is a banker and Gayatri is not his daughter. Therefore, we have

Name	Daughter	Institute	Profession
Rajesh	Neha	A	Banker
Prakash			Businessman
Sameer		C	Consultant/Mkt Professional
Tushar		L	Mkt Professional/Consultant
	Gayatri		Consultant
	Shweta	A/B/C	Banker/Businessman

It can now be seen that Shweta is the daughter of Prakash, who is an alumnus of NIM-B.

Name	Daughter	Institute	Profession
Rajesh	Neha	A	Banker
Prakash	Shweta	B	Businessman
Sameer	Gayatri	C	Consultant/Mkt Professional
Tushar	Gayatri	L	Mkt Professional/Consultant

Now all questions can be answered.

11. Hence [2]

12. Hence [2]

13. Hence [3]

14. Hence [4].

LR-1.2 | CONDITIONALITIES & GROUPING

PRACTICE EXERCISE

1. Two professors, B and C from Physics department are selected. That means A and D are not selected.

According to condition 5, O must be selected. According to condition 1, S must not be selected. According to condition 2, P must not be selected. Therefore the two professors from Mathematics department must be Q and R. Therefore so far we have,

Department	Professors
Physics	B, C
Chemistry	O
Mathematics	Q, R

Since B and R have been selected, N cannot be selected according to condition 3. Therefore second professor from Chemistry department can be L or M.

Therefore the members of the committee can be selected in two different ways. Therefore the required answer is 2.

2. According to condition 3, exactly two of B, N and R must be selected. Since N and O are selected, exactly one of B and R must be selected. Therefore we have the following possibilities:

Department	Possibility 1	Possibility 2
Physics	B	
Chemistry	O, N	O, N
Mathematics		R

Possibility 1:

The other professor from Physics department can be A, C or D. Accordingly we have the following possibilities:

Department	Possibility 1a	Possibility 1b	Possibility 1c
Physics	B,A	B,C	B,D
Chemistry	O,N	O,N	O,N
Mathematics	S, P/Q		P,Q
Comments	**Condition 1:** S must be selected. **Condition 3:** R cannot be selected. Second professor from Mathematics can be P or Q. (Total 2 ways)	**Condition 1:** S cannot be selected. **Condition 2:** P cannot be selected. **Condition 3:** R cannot be selected. Therefore two professors from Mathematics department cannot be selected. (Total 0 ways)	**Condition 1:** S cannot be selected. **Condition 3:** R cannot be selected. **Condition 4:** Q must be selected. **Condition 5:** Satisfied. Second professor from Mathematics department has to be P. (Total 1 way)

Possibility 2:

Second professor from Mathematics can be P, Q or S. Accordingly we get the following possibilities:

Department	Possibility 2a	Possibility 2b	Possibility 2c
Physics			
Chemistry	O, N	O, N	O, N
Mathematics	R, P	R, Q	R, S
Comments	**Condition 1:** A cannot be selected. **Condition 2:** C cannot be selected. **Condition 3:** B cannot be selected. Therefore two professors from Physics department cannot be selected. (Total 0 ways)	**Condition 1:** A cannot be selected. **Condition 3:** B cannot be selected. Two professors from Physics department are C and D. In that case, conditions 2, 4 and 5 are also satisfied. (Total 1 way)	**Condition 1:** A must be selected. **Condition 3:** B cannot be selected. **Condition 4:** D cannot be selected. Therefore second professor from Physics must be C. In that case, condition 2 is also satisfied. (Total 1 way)

Therefore total required number of ways = 2 + 1 + 1 + 1 = 5.

Therefore required answer is 5.

3. If P and R both are selected from Mathematics department, Q and S are not selected. Therefore D cannot be selected (condition 4). Similarly A cannot be selected (condition 1) and C cannot be selected (condition 2). Therefore there is only one possible candidate from Physics department, which violates the requirement of having at least two.

   Therefore the required answer is 0.

4. If A and L both are selected, S must be selected (condition 1). Exactly two of B, N and R must be selected. Therefore we have the following possibilities:

Department	Possibility 1	Possibility 2	Possibility 3
Physics	A, B	A,B	A
Chemistry	L, N	L	L,N
Mathematics	S	S,R	S,R
Comments	Second Mathematics professor can be P or Q (Total 2 ways)	Second Chemistry professor can be either M or O (Total 2 ways)	Second Physics professor can be only C. D cannot be selected as presence of D will require presence of Q as well from condition 4. (Total 1 way)

   Therefore required total number of ways = 2 + 2 + 1 = 5.

   Therefore required answer is 5.

5. Only Option [4] satisfies all conditions and is possible. Hence [4].

6. All of the given groups are possible. Hence [4].

7. Paul is present in the group. Therefore, Anna is also present in the group. The other woman in the group is Cheryl.

   Using condition 4, John cannot be present. The other two men are Shawn and Albert. If Albert is present,

then John has to be present, which violates our earlier conclusion. Therefore, no such group is possible. Hence [1]

8. If Anna is present in the group, according to condition (1), Paul is also present. According to condition (5), John has to be present in the group. It is given that Albert is present in the group and Shawn is not present. According to condition (3), Terry cannot be present in the delegation. Since Shawn cannot be present, the fourth man in the delegation has to be Roger. Therefore the four men present are Paul, John, Roger and Albert.

   Among women, it is given that Anna is present. Since Roger and John are present in the delegation, according to condition (4), Cheryl cannot be present. The other woman in the delegation can be one of Brenda, Dana or Heather.

   Therefore the delegation can be selected in 3 different ways.

   Hence [2]

9. If Mary has been selected, John cannot be selected. Also, Steve cannot be selected because he cannot serve in a committee with any woman. The other two members of the committee can be selected from among Chris, Bill, Janet and Kathy.

   Hence [3]

10. If Janet and Kathy have been selected, Steve cannot be selected. The third member of the committee can be selected from Mary, Chris, John and Bill.

    Hence [4]

11. If Chris and Bill refuse to serve, at least one woman must be selected. Therefore, Steve cannot be selected. As a result, the committee can have at most one man.

    Therefore, we have the following possibilities:

i. Committee with all the three women: All of Janet, Mary and Kathy serve on the committee. This can be done in only one way.

ii. Committee with two women and one man: The only man who can be selected is John. Therefore, Mary cannot be selected. As a result, the other two women, Janet and Kathy, should be selected. This can be done in only one way.

    Therefore the committee can be selected in two ways.

    Hence [2]

12. If John has been selected, Mary cannot be selected. If there is at least one woman on the committee, Steve cannot be selected.

    The other two members of the committee will have one man and one woman.

    One man can be selected out of Chris and Bill. One woman can be selected out of Janet and Kathy.

    Therefore, the total number of people is 4.

    Hence [1].

13. If Bill and Vishal ride together in the same car, the other two cars must be driven by Vineeta and Peggy. The three Sharma brothers ride in different cars. Therefore, the two Hamilton sisters will have to ride in different cars.

    Hence [3].

14. If Peggy and Chelsea are together, Barbara and Bill have to travel in different cars because at least one member of each family must be present in each car. Therefore, options [1] and [4] are ruled out. Vikram, Barbara and Varun cannot travel together in the same car because at least one adult has to be present in the car. Therefore, option [3] is also ruled out.

    Hence [2]

15. If Bill and Vineeta are together in one car, the other two cars must be driven by Peggy and Vishal. Therefore, they cannot travel in the same car. Hence [2]

16. If the three Sharma children travel in different cars, out of four parents, the Sharma parents cannot be together in the same car. This is because in that case one car will have no member from the Hamilton family. However, Hamilton parents can travel together in the same car. Hence [2]

Verbal Ability

VA-1.2 | QUESTION TYPES

PRACTICE EXERCISE 1

1. 'Rudimentary' means 'very basic or elementary'. Its opposite is 'developed'; hence B-E. 'Lethargic' means 'lazy or sluggish'; 'fortified' means 'defended', and 'sincere' means 'honest'. Hence, (2).

2. 'Dolorous' means 'mournful' or 'causing pain or sorrow'. 'Cheerful', which means 'happy' is opposite to the word 'dolorous'; so A-D. 'Astute' means 'clever or discerning'; 'corrupted' means 'contaminated or polluted' and 'convenient' means 'favourable'. Hence, (3).

3. 'Conscientious' means 'meticulous' or 'scrupulous'; hence B-E. 'Festering' means 'rotting'; 'hypothetical' means 'assumed'; and 'serrated' means 'ragged or indented'. Hence, (2).

4. 'Prognosis' means 'a forecast or a speculation'. 'Prediction' is similar in meaning to 'prognosis'; hence B-E. 'Aesthetics' refers to 'artistic taste'; 'deluge' refers to 'flood'; and 'vogue' refers to 'current trend or fashion'. Hence, (2).

5. 'Nefarious' means 'extremely wicked or sinful'. 'Respectable', meaning 'worthy of respect' or 'admirable', is opposite in meaning to 'nefarious'; thus the C-D pair. 'Inadvertent' means 'accidental'; 'comprehensive' means 'having an extensive range' and 'affluent' means 'wealthy'. Hence, (2).

6. 'To take off after' someone means 'to chase them down'. 'Take after' someone means 'to resemble someone in appearance or character'. Sentence (1) should read, 'She is a good singer; she takes after her aunt in that respect'. Hence, (1).

7. When you 'stand off' someone you 'prevent him or her from attacking you' or 'you avoid someone'. When you 'stand over' something you 'postpone it'. The sentence should read, 'We must stand over the deal, we can always complete it later'. Hence, (2).

8. 'Make-believe' is a singular word and is used with a hyphen. It refers to an imaginary scenario. Hence, (1).

9. Sentence (4) should read, 'He took a lot of convincing, but eventually he gave way', meaning after a lot of convincing he yielded. Hence, (4).

10. In sentence (3), the phrase should be 'brought' and not 'bought' to book. Hence, (3).

11. A speaker can 'imply' (indicate or suggest) something and the listener can 'infer' (derive by reasoning or conclude) the intended meaning from the speaker's words or tone. In sentence (1) we have to use 'implied'. 'Climactic' deals with a climax, 'climatic' deals with the weather. Hence, we have to use 'climactic' in (2). 'Loath' means 'reluctant', whereas 'loathe' means 'to dislike intensely'. In sentence (3) we have to use 'loath'. A person who proves his or her 'mettle' displays courage or stamina. This has nothing to with 'metals', i.e., gold, silver, copper, etc. In sentence (4) the appropriate word is 'mettle'. The correct sequence is AABB. Hence, (3).

12. 'Miners' are 'people working in a mine', while a 'minor' is 'a child'. In (1) we have to use 'miners'. An 'award' is handed out in recognition of one's achievements. A 'reward' is given out when someone finds a missing item or person. So, in (2), the correct word is 'reward'. 'Proscribe' means 'to ban', while 'prescribe' means 'to recommend the use of'. In sentence (3) we have to use 'proscribe'. 'Noise' refers to 'a harsh or unwanted sound'. Since the audience enjoyed the guitar, we should use 'sound'. The correct sequence is BAAA. Hence, (1).

13. 'Grisly' means 'horrible'; 'grizzly' means 'greyish'. In (1) we have to use 'grisly'. A speech that is 'heartening' gives you courage or confidence while one that is 'heart-rending' makes you feel terribly sad. Hence in (2), 'heartening' is correct. You 'install' equipment, while you 'instil' feelings or attitudes. In sentence (3), 'instil' is correct. A free item is a 'complimentary' gift, but items or people that go well with each other are 'complementary'. The word we should use in (4) is 'complimentary'. The correct sequence is BBBA. Hence, (3).

14. The literal meaning of a word is its 'denotation'; the broader associations we have with a word are its 'connotations'. As two words are being linked to 'failure', their broader associations must be referred to. In (1) we have to use 'connotation'. 'Continuous' refers to actions that are uninterrupted. 'Continual' actions are not continuous; they are

only repeated periodically. Hence, we should use 'continually' in (2). An official group that deliberates, like the Council on Foreign Relations, is a 'council'; all the rest are 'counsels': your lawyer, advice, etc. In (3) we have to use 'counsel'. 'Gaffe' means 'an embarrassing mistake', and should not be mixed up with 'gaff', which means 'a hook used for landing large fish'. In (4) 'gaffe' is correct. The correct sequence is AAAB. Hence, (4).

15. 'Jibe' is 'a taunting or sarcastic remark' while 'jive' is 'a genre of music and dance'. In (1) we have to use 'jibe'. 'Defective' means 'faulty', 'deficient' means 'lacking in something'. In (2) we have to use 'defective'. You 'defuse' a dangerous situation by treating it like a bomb and removing its fuse; to 'diffuse', in contrast, is 'to spread something'. In (3) we have to use 'defuse'. A 'descent' is 'a downward slope'. 'Dissent' means 'disagreement'. In (4) we have to use 'descent'. The correct sequence is BAAA. Hence, (3).

PRACTICE EXERCISE 2

1. Default : N. failure to act or be present; failure to honour a promise or pay a debt
2. Brook : V. tolerate; endure
3. Catholic : ADJ. wide-ranging or broad; liberal; universal
4. Sheer : ADJ. thin and transparent
5. Buffet : N. tremendous blow; slap
6. Deliberate : V. consider; ponder; discuss
7. Intimate : V. hint or suggest; give information
8. Pluck : N. courage
9. Rent : V. past tense of rend (disturb (the air) sharply with noise)
10. Transports : N. strong emotion; rapture, ecstasy, etc.
11. Bid : V. commanded; ordered
12. Riddled : V. pierced with many holes
13. Slight : N. insult to dignity; snub
14. Scrape : N. an embarrassing or difficult situation caused by one's own mistake
15. Fell : ADJ. cruel; deadly and dangerous
16. Smart : V. cause or feel a sharp pain
17. Latitude : N. freedom from rules or limitations
18. Wax : V. grow; increase
19. Base : ADJ. contemptible; morally corrupt; inferior in quality or value
20. Rank : ADJ. offensive in odour or flavour; decaying
21. An 'altercation', meaning 'a heated or angry dispute', can result in a criminal case. An 'alteration' refers to 'a change or modification'.

    An object that isn't moving is 'stationary'. A 'stationery' shop stocks writing material.

    'Batten down the hatches' is an idiomatic expression, which means 'to prepare for an emergency'. A 'baton' is a 'small rod'.

    To 'ascribe' is 'to attribute something to someone'. To 'subscribe' is 'to agree to something' or 'to pledge for something'.

    Thus, the correct sequence is ABAB. Hence, (1).
22. 'Alumnus' is singular, 'alumni' is plural. Here the plural form is required.

    'Sensual' relates to physical desires while 'sensuous' refers to aesthetic or artistic qualities in things like art or music or in this case architecture.

    'Indifference' refers to 'an apathetic view on things'. 'Ambivalence' means 'a clash of two different views'. Here, we should use 'ambivalence'.

    'Anxious' and 'eager' are used interchangeably but anxious has a negative connotation, as it refers to nervousness. When you look forward to something that you know is going to make you happy, you are 'eager', not 'anxious'.

    Hence, the correct sequence is ABAB. Hence, (1).
23. To 'straighten' is 'to become straight' or 'put in order'. To 'straiten' is 'to constrain options' or 'to put one in difficult circumstances'. Here, we should use 'straitened'.

    A 'sojourn' is actually 'a temporary stay in one place'. If you're constantly on the move, you're not engaged in a 'sojourn'. Hence, we should use 'journey' here.

    A 'benefactor' gives benefits; a 'beneficiary' receives them. Hence we should use 'beneficiary' here.

A 'crevice' is 'a tiny crack in a wall'; a 'crevasse' is 'a huge crack in a sheet of ice'. Here, we should use 'crevice'.

Hence, the correct sequence is BABB. Hence, (4).

24. 'Urbane' means 'courteous, polite, refined or suave'. 'Urban' means 'related to a city'. The tone in a letter has to be 'urbane' and not 'urban'.

'Invaluable' means 'precious'; 'inexpensive' means 'of very little value'. An imitation off the streets is usually 'inexpensive'.

'Carousal' is 'a wild drunken party'. A 'carousel' is either 'a merry-go-round' or 'a rotating platform'. Here, it refers to the merry-go-round.

'Repatriate' means 'send someone back to their home country'; 'expatriate' means 'a person living outside his/her native country'. In this case, the correct word should be 'repatriate'.

Hence, the correct sequence is ABAA. Hence, (3).

25. 'Peddle' means 'to carry small articles from place to place for sale' while 'pedal' means 'to use one's feet to turn the pedals of a bicycle etc.' Thus 'peddle' should be used in the first sentence. 'Confidantes' mean 'women to whom secrets are entrusted' while 'confidence' means 'a relation of trust or intimacy'. Thus only 'confidantes' can correctly fit the second sentence. 'Invoking' means 'citing as authority' while 'evoking' means 'eliciting or drawing forth'. Since the lawyer used the self-defence principle, only 'invoking' correctly completes the third sentence. 'Faint' means 'weak' while 'feign' means 'give a false appearance of'. Since he tried to appear ignorant, only 'feign' fits the fourth sentence correctly. Thus the correct sequence is AAAB. Hence, (1).

PRACTICE EXERCISE 3

1. Desert : N. waterless, desolate area of land
   V. abandon in a treacherous manner
2. Founder : N. person who establishes an institution or settlement
   V. fail or sink
3. Season : N. weather-based division of the year
   V. add spices to food
4. Husband : N. a married man (with respect to his wife)
   V. use economically
5. Humour : N. the quality of being amusing or comic
   V. comply with unreasonable wishes to keep someone content
6. Low : ADJ. of less than average or requisite height
   V. (of a cow) make a mooing sound
7. Rest : N. the remaining part of something
   V. cease work or movement in order to relax
8. Converse : N. a situation, object or statement that is just the opposite of another
   V. engage in conversation
9. Purchase : V. acquire something by paying for it
   N. firm contact or grip
10. Partial : ADJ. incomplete; existing only in part
    ADJ. having a special liking for some thing
11. 'Incriminate' and 'adjure' are both verbs, whereas in the given context we require an adjective. 'Incriminate' means 'to accuse or blame' and 'adjure' means 'to charge or command earnestly'. Among the given options, only 'puerile' is an adjective. 'Puerile' means 'childishly foolish' or 'immature and trivial'. In both the sentences, the word 'puerile' can fit perfectly. Hence, (2).
12. 'Placative' means 'intended to appease or pacify'. 'Egregious' means 'extraordinary in some bad way; glaring'. 'Congenital' means 'inborn or pertaining to a condition present at birth'. 'Placative' can fit the first blank; the sentence will imply that the target is somewhat unachievable and has been set only to appease or pacify certain people. The second sentence implies that since the Prime Minister has decided to send token and combat-avoiding units, he must be trying to placate or appease Afghanistan. Therefore, 'placative' can fit in the blank. Hence, (1).
13. First let us look at the meanings of the words given as options. 'Epitaph' is 'a short piece of writing about a dead person, usually inscribed on a gravestone'. 'Epigram' is 'a short witty saying that expresses an idea in a terse manner'. 'Epigraph' is 'a quotation at the beginning of a book / chapter or an inscription on a building or statue'. The first blank should have the word 'epigrams' because it is followed by a short and witty quotation. From the context, it is clear that the second blank should

also have the word 'epigrams'. The third blank should have the word 'epigraph' because a short and witty saying is often used at the beginning of a book or a chapter. One would not use an epigram on a tombstone. The inscription on a tombstone is usually about the person who is buried there. Thus, the fourth bank would have the word 'epitaph'. Only (5) gives the correct sequence of the words. Hence, (5).

14. First let us look at the meanings of the words given as options. 'Quite' means 'to a considerable extent or degree'. 'Quiet' means 'making very little noise'. 'Ordinance' is 'a law or rule made by a government or authority'. 'Ordnances' are 'military weapons or ammunition'. The first blank requires an adverb that would qualify the adjective 'democratic'. So, only 'quite' can be used here. The second blank should have the word 'quiet' because it refers to the Parliament's silence on certain issues. An 'ordinance' and not 'ordnances' can be passed by the Parliament. Therefore, the correct sequence of words is 'quite, quiet, ordinances'. Hence, (4).

15. The question words are antonyms of each other, as are the ones in options (1), (2) and (4). (3) does not have this relationship. Hence, (3).

16. 'Invective' and 'praise' are antonyms. The pairs in options (1), (3) and (4) are also antonyms of each other. The correct option is (2), as 'brook' and 'tolerate' are synonyms. Hence, (2).

17. The capitalized pair are synonymous, as are the ones in options (1), (2) and (4). However, the pair in (3) are opposites: 'stentorian' means very loud or booming. Hence, (3).

18. A 'soirée' is a 'gathering', but a 'mallard' is not a 'hammer'. The pairs in options (1), (2) and (3) are synonyms, like the capitalized pair. Hence, (4).

19. A 'donor' shows 'generosity'. The same relationship holds for options (1), (2) and (3). However, a 'snob' does not show 'truculence', i.e. defiance. Hence, (4).

20. A 'caterpillar' grows into a 'butterfly'. All the options have the relationship of a young animal to its adult form. However, in option (3), a 'filly' refers specifically to a female young horse, and not a young horse in general. Hence, (3).

21. The relationship is that of a quality and an animal or thing associated with it in idiomatic phrases, i.e. 'as gentle as a lamb', and so on. But (4) does not fit this pattern: the correct phrase is 'as sly as a fox', not 'jackal'. Hence, (4).

22. Only option (3) matches all the meanings correctly with all the usages. Hence, (3).

23. Only option (1) matches all the meanings correctly with all the usages. Hence, (1).

24. Only option (2) matches all the meanings correctly with all the usages. Hence, (2).

25 . Only option (2) matches all the meanings correctly with all the usages. Hence, (2).

VA-1.3 | SPEED READING

PRACTICE EXERCISE

1. This question goes directly to the heart of the matter – the purpose. Locate the topic sentence of the passage and the rest should be easy. Sentences 5 and 6 of paragraph 1 clearly indicate the answer. Hence, [2].

2. See paragraph 2, sentence 5, which indicates what statement 3 states. Hence, [3].

3. Quickly scan what Carol Prives has to say about the p53 gene in paragraph 3. Both [2] and [3] are mentioned. Hence, [4].

4. As per the first sentence of the last paragraph, most p53 mutations are not inherited.
Hence, [2].

5. Refer to paragraphs 5 to 7. [1] and [4] contradict what is stated about the p53 genes of those who have Li-Fraumeni syndrome. Nothing is mentioned about a bad p53 gene destroying the good p53 gene, so [2] is wrong. Only [3] can be inferred, based on the ribbon example. Hence, [3].

6. The last two sentences, the topic sentences of the paragraph, and summation of the passage reveal the answer. Hence, [4].

7. There isn't one main concern regarding the Brazilian economy that has been highlighted in the passage. All three concerns i.e. [1], [2] and [3] have been talked about at separate places in the passage. Hence, [4].

8. The first two sentences of the sixth paragraph reveal the answer. Hence, [1].

9. The sixth and the seventh paragraphs reveal how inflation has been a problem for Brazil since the early 1980s. Though its method of dealing with inflation has attracted a lot of foreign money, the paragraph doesn't state that this has given Brazil a significant edge. So, [4] is false. The second sentence of the penultimate paragraph makes [1] correct. [2] can be calculated from the last sentence of the first paragraph. [3] can be inferred from the penultimate sentence of the passage. Hence, [4].

10. Iron ore, soybeans and sugar have been mentioned in the very first line of the passage. Items in [1] and [4] are mentioned in the last sentence of the penultimate paragraph. The third paragraph discusses how expensive croissants and bikes are, but doesn't mention that they are exported. Hence, [3].

11. In the case of this passage, the first and the last paragraph clearly indicate the primary purpose of this passage: to show that history can be treated as a science, if it uses the comparative method. Only option [3] states this. Hence, [3].

12. Paragraphs 4 and 5 indicate that I and II affect economic prosperity. III cannot be inferred since paragraph 5 shows that the Dominican Republic prospered despite being ruled by a dictator. Hence, [1].

13. The last paragraph clearly indicates that a scientific method isolates the handful of factors that account for a majority of the variance; the paragraph argues that the comparative method is one such method and can be used to make the study of history a science. Only option [1] states this. Hence, [1].

14. Statement I is too extreme and cannot be inferred from the passage. The whole idea of the passage is that innovation is fostered by getting as many ideas and as many minds together. From this it can be inferred that the more diverse the ideas, the more chances are that they will interact in ways that result in more innovation, i.e. statement II. The third paragraph starts by saying that closed environments, which were the norm for innovation as mentioned in the second paragraph, make it more difficult to explore the adjacent possible. It then goes on to state that big companies are now beginning to embrace open environments. So why should companies change? The reason for this must be that they have reached their saturation as far as innovation in closed environments is concerned, i.e. statement III. Hence, [2].

15. There are various phrases in the passage which describe the way innovation occurs when many ideas are placed together: ideas can 'serendipitously' (discovery by accident or fortunate coincidence) connect. These are unplanned collisions. So, innovation occurs not by a plan but by unplanned or lucky accidents. Hence, [1].

16. The question is about the transition in how companies foster innovation. The earlier rationale is stated in the second paragraph: the huge financial reward will be the incentive for people to innovate. So the focus was on the incentive to innovate. Whereas in the new ways, the focus is on creating conditions that will enable innovation to occur, i.e. open environments. Statement II mentions this. Statement I can be inferred as well, especially from the last two sentences of the last paragraph. Statement III can be inferred from the examples of organizations like IBM and Procter & Gamble, as well as Web startups that encourage outsiders to innovate on their products. Therefore, all three statements are correct. Hence, [4].

17. In the first paragraph the author is highlighting the significance of the revolutionary forces gathering in the Arab world. In the second he analyses the reason behind it and also suggests how the future might pan out – a full-fledged Arab democracy or another dictatorship – and stresses the importance of international support to the Arab democratic cause. Only option [2] captures the purpose of both the paragraphs. Options [1] and [3] limit themselves to parts of the first and second paragraph respectively. Option [4] relates to just a minor point made in the first paragraph. Hence, [2].

18. The author's tone in the first paragraph is extremely positive, so 'incredulous', which means 'disbelieving' is a bit too negative. The author already seems to know what has happened, so 'curious', meaning 'eager to know', does not really fit. While the author is indeed 'cheerful', the word that best describes his tone in the passage is 'excited': he uses positively charged phrases like 'epiphanic moments of global history' and 'clarion call for democracy' to express his excitement about what is happening in the Arab countries. Hence, [2].

19. There is no hint in the passage as to how long the Arab nations were planning revolution. So [1] cannot be inferred. According to the first paragraph, no one predicted the Arab revolutions, not even the left wing radicals, so [2] is incorrect. Though the author wonders whether the revolting Arab nations will be able to maintain their tentative hold on democracy, he would not say that it is unlikely. Only [4] is correct, as it is stated in the second paragraph: 'These revolts are also illustrative of the radical and disruptive political power of new communication technologies, which have achieved in some measure what decades of traditional political work could not.' Hence, [4].

20. 'Harangue' means a 'verbal attack', i.e. a 'tirade'. 'Qualm', meaning 'doubt', 'squabble', meaning 'quarrel', and 'trepidation', meaning 'anxiety', are not similar in meaning to 'harangue' at all. Hence, [3].

21. Refer to the last sentence of the second paragraph: the author states that the concept of determinism tends to be confused with similar concepts such as predictability and fate. He then goes on to disentangle its true meaning from these other concepts. Option [2] best captures this. Option [1] is incorrect: though the author mentions the roots of determinism in the first paragraph, he does not trace its history after that. Leibniz and Laplace are mentioned only in the first and last paragraphs respectively and the passage is not about the difference between their concepts of determinism. The author shows the differences not the similarities among determinism, predictability and fate. Hence, [2].

22. The last paragraph is a description of the 'famous expression of determinism by Laplace'. According to Laplace, an intelligence that knew all the forces acting in nature at a given instant and the momentary positions of all things in the universe, and was powerful enough to analyse all this data, could predict the future. The possibility is clearly theoretical, since Laplace does not suggest that human beings have or ever could have such a capacity. Hence, [1].

23. Refer to the third paragraph: 'we can imagine that certain things are fated to happen, without this being the result of deterministic natural laws alone; and we can imagine the world being governed by deterministic laws, without anything at all being fated to occur'. Therefore [1] is true. Such a relationship between predictability and determinism, or between fate and predictability is not mentioned in the passage. Hence, [1].

24. Refer to the first paragraph. [1] is not what Leibniz's Principle of Sufficient Reason is stated to be (it is similar to Laplace's views stated later in the passage). [2] is correct, as stated in the second sentence of the paragraph. However, [3] is not quite true: philosophers of science do not consider Leibniz's Principle of Sufficient Reason necessary for understanding determinism, but it is an exaggeration to say that they reject it outright. Hence, [2].

VA-1.4 | UNDERSTANDING PASSAGES

PRACTICE EXERCISE 1

1. Option [2] contradicts the author's emphasis on politics. [3] can be dismissed as it is a very general statement. [4] is close but is ruled out on account of the last phrase, which contradicts what the author has said in the passage. Only [1] sums up the author's argument, thus providing a good conclusion. Hence, [1].
2. Everyone who thought differently from those in power was silenced by extra-constitutional power. Hence, [2].
3. Throughout the passage, the author's main grouse against Nduom seems to be his lack of political vision. Hence, [2].
4. According to paragraph 5, those who wield political power do affect society when they make significant economic decisions. Hence, [3].
5. Refer to the second sentence of the seventh paragraph. Hence, [2].
6. Refer to paragraph 10. [1] best expresses the liberal nature of democracy. Hence, [1].
7. The author is merely critical of the views expressed by Nduom. There is no hint of any kind of personal sentiment involved. Hence, [4].
8. [1], [3] and [4] are negated because the passage as a whole deals with the importance of politics as a contributing factor towards the success of democracy. Hence, [2].
9. The focus of the passage is clearly polygraph testing. The judgment about forensic evidence in general is not representative of the passage, hence [2] is out. The passage does not focus on the polygraph's popularity. So [3] is out. Since the passage does not sound optimistic about the future of the polygraph, [4] is out. [1] gives a summary of the passage. Hence, [1].
10. 'Paramount importance' as mentioned in [1] is too extreme an inference. [3] is the opposite of what the author is stating. [4] is untrue as per the passage, since it is internally flawed – the author does not acknowledge the scientific basis of the polygraph. [2] is generalized, but true to the author's attitude on the issue. Hence, [2].
11. Scan the 4th and 5th paragraphs. Since the Fifth Amendment is related to the defendant's rights to refuse proceedings, this can only relate to his personal rights in some ways. [2] and [3] are irrelevant here. Between [1] and [4], only [1] relates to an individual's own constitutional rights. Hence, [1].
12. The question asks for the statement that is unlikely to be a factor that would sway public's opinion in favour of polygraph testing. [1], [2] and [3] are likely to be factors that would do so. [4] is a factor that may be concerned with the polygraph testers and practitioners and not with the general public as such. Hence, [4].
13. The focus is clearly polygraphs and not the broader issue suggested in [1]. [3] does not make sense as per the passage. This is obviously a case against, not for polygraphs, so [4] is out. This leaves us with [2], which succinctly states the theme of the passage. Hence, [2].

14.

PARAGRAPHS	PRIMARY PURPOSE
1	To introduce the idea that great scientists ask questions that challenge conventional thinking, using the example of Einstein's curiosity
2 & 3	To elaborate on Einstein's hypothesis and to show how it was related to earlier theories
4	To explain the challenges before Einstein and the qualities that make him special
5	This paragraph introduces the key idea that the author intends to put forth. The rest of the paragraphs have been laying the foundation for the idea expressed in this paragraph: great scientists take on path-breaking projects because of certain fundamental beliefs or themata they hold about the functioning of the universe; in Einstein's case he strongly believed that the entire universe was governed by a few simple laws.
6 & 7	To develop the idea that great scientists hold on to themata like religious devotees hold on to religious beliefs and use them to explain the workings of the universe

Each of the answer options is the primary purpose of one of the paragraphs. The key lies in identifying the build up of supporting ideas/arguments towards the main/central idea, which is that great scientists are guided in their work by beliefs that are almost like religious beliefs (see paragraph 5). Hence, [3].

15. Though the example of Einstein's theory of relativity takes up a significant portion of the passage, it only serves to illustrate the central idea. So options [3] and [4], which focus only on Einstein are wrong. [2] sets up a false dichotomy – the passage does not suggest that science and religion are opposed to each other. Rather, the passage shows that great scientists' beliefs in the methods and purposes of science are almost religious in nature. Therefore, only [1] is a suitable title. Hence, [1].

16. Only [3] gives the correct word-meaning combinations. Hence, [3].

17. 'Triumph' means 'victory'. Hence, [4].

18. According to the fifth sentence of the passage: But the magnificent.....only for time, the living should look at life for only a short while. Hence, [3].

19. 'Rapture' means 'ecstatic joy'. Hence, [4].

20. One sees 'a reflection' of any image that falls on the surface of the water. So, by the last line the author means that the mind is only a reflection of the self. Hence, [4].

21. The passage talks about how wonderful it is to be alive and how one should experience the joy of living, so 'Alive and Kicking' would be the most suitable title for this passage. Hence, [4].

PRACTICE EXERCISE 2

1. As per the last sentence of the passage, the workers of the future will have income but not work. Hence, [2].

2. As per the twelfth sentence of the last paragraph – But has the socialist thought about what he would do if owing to technological advance, the amount of human labour were catastrophically reduced – socialism has not taken into consideration the possibility of an immense reduction of human labour in the wake of mechanization. Hence, [3].

3. As per the tenth sentence of the last paragraph – The labour movements arose largely as a revolt against the conception of workers as commodities to be bought and sold without regard to their needs as human beings – the labour movements arose as a revolt against the conception of workers as commodities. Hence, [3].

4. As per the fourth sentence of the last paragraph, the chief purpose of competitive enterprise is to realize the maximum profit. Hence, [4].

5. The first sentence of the last paragraph clearly states that in the situation created by the rapid extension of machine production, our object should be to limit the amount of leisure to that which can be profitably used. Hence, [3].

6. As per the first paragraph, the artist, the writer, the scientist etc. do not consider their calling as work and find pleasure in their work by using their creative energy. Option 1 mentions about the utilitarian value which is a characteristic of

work and not occupation. So it can be negated. Though the third sentence mentions that occupation absorbs time and energy as long as a person gives it, option 3 incorrectly states that workers choose to give their time and energy. Thus it can be negated. As per the eighth sentence of the first paragraph, their reward is doing their work. Thus option 4 can also be negated. Hence, [2].

7. Option 1 is true as per the second sentence of the first paragraph. Option 2 is true as per the third sentence of the same paragraph. Option 3 is also true according to the fifth sentence of the first paragraph. However, as per the seventh sentence of the first paragraph, there are some forms of work which can hardly be differentiated from occupation. Thus option 4 is not true as per the passage. Hence, [4].

8. The desire to make a profit is mentioned in relation to competitive enterprise and not occupation. Thus option 1 is incorrect. Nothing has been mentioned about people taking up occupation because they want to do something uncommon. Thus option 2 is also incorrect. Work talks about utility in general and not something as being useful to society. Thus option 3 can also be negated. As per the first paragraph, occupation demands constant initiative and people taking up an occupation choose to give it time and energy as per their will. Thus only option 4 correctly states the chief reason for a person taking up an occupation. Hence, [4].

9. As per the first paragraph, if work is performed by a suitable agent, some amount of pleasure can be associated with it. Thus option 1 can be negated as work is not unpleasant at all times. Option 2 can also be negated as sometimes work and occupation cannot be differentiated, and for most people, the pleasure of occupation needs the addition of the necessity provided in work. As per the fourth and fifth sentence of the first paragraph, work has utility while occupation is an end in itself. Retain option 3. The first sentence of the paragraph itself states that there should be a distinction between work and occupation. Thus option 4 is incorrect. Hence, [3].

10. As per the last paragraph, salinization is a problem caused due to inadequate drainage of irrigated water. Option 1 is incorrect as it specifically mentions irrigation with well-water. As per the third paragraph, not practicing crop rotation leads to the loss of soil nutrients and not salinization. Thus option 2 is also incorrect. As per the fifth and sixth sentences of the first paragraph, natural fertility is quickly exhausted in the sub-tropical forest regions. However, since the question is related to salinization, option 3 is incorrect. Hence, [4].

11. Though the first sentence of the passage talks about soil erosion, the passage is about maintaining the fertility of soil. Thus option 1 is incorrect. The fourth sentence of the first paragraph only mentions that soil fertility is renewed in areas of active volcanism. However, agriculture in volcanic islands is not mentioned in the passage. Thus option 2 can be negated. The importance of chemical fertilizers is only stated in the penultimate sentence of the second paragraph. Thus option 3 is unsuitable as a title for the passage. Throughout the passage, the author mentions various ways in which soil fertility is lost and the various ways in which fertility can be regained. Thus option 4 is the most appropriate title to this passage. Hence, [4].

12. As per the fifth and sixth sentences of the first paragraph, natural fertility is quickly exhausted in the humid tropical forest regions. Hence, [2].

13. The example of the Nile river depositing a rich layer of silt over the soil to restore its fertility is mentioned in the first paragraph. Negate option 1. The last sentence of the third paragraph states how bacteria can restore nitrogen to the soil, thus restoring its fertility. Negate option 2. Nothing has been mentioned about fertilizer fixation through lightning. Retain option 3. The second paragraph mentions how organic manures were used to restore the fertility of soil. Thus option 4 can be negated. Hence, [3].

14. As per the second sentence of the second paragraph, crop rotation helped to maintain the condition of the soil, and also to prevent the build-up of those insects and other plant pests that are attracted to a particular kind of crop. Hence, [3].

15. The first paragraph only mentions that the annual flooding of the Nile helped in restoring the fertility of the soil. Thus nothing has been mentioned about the Nile water containing bacteria, excess of salts or nutritive material. This negates options 1, 2 and 4. However, the last paragraph states that areas that have insufficient rainfall but are irrigated develop the problem of salinization due to poor drainage. Thus it can be inferred that the

agricultural land in the Nile basin consists of heavy soil with poor drainage properties. Hence, [2].

16. As per the last sentence of the penultimate paragraph, plants with nodules on their roots are known as legumes. Hence, [3].

17. The main aim of the author is to show how ants from one community recognise each other though they are hostile to ants of the same species from other communities. Option 1 is too general as the passage is specifically related to ants. Negate it. Although the author wants us to learn to be more cooperative to our community members, it is just a thought in the first paragraph and not the main aim in writing the passage. Thus option 2 is incorrect as a title for the passage. Option 3 is wrong as the ants did not get drunk voluntarily but were forced by the author to become drunk by putting them into whisky. Also, the author conducted this experiment in order to test if each ant nest has some sign or password by which they recognize one another. Negate option 3. Option 4 is a suitable title for the passage as this is what the author is trying to prove in the passage. Hence, [4].

18. In all the three paragraphs, the author reiterates that ants from one community attack ants from a different community though they belong to the same species. Thus the attitude of ants towards strangers of the same species may be categorized as 'hostile' i.e. antagonistic. Hence, [3].

19. Since the ants would not voluntarily get drunk, option 1 is supported. Option 2 is also supported by the anecdote as other ants carried away their drunk friends. Option 3 is also supported by the anecdote as the other ants were able to recognise their intoxicated comrades although the drunk ants were not in a position to give any sign or password of recognition. However, option 4 is not supported by this anecdote as the drunk ants were not in a position to give any sign or password of recognition. Hence, [4].

20. As per the second sentence of the last paragraph, chloroform was fatal for the ants. Hence, [4].

21. 'Sophistry' means 'a false argument', 'whimsy' means 'capricious humour' and 'hypocrisy' means 'a pretence of having some desirable attitude'. Since the author is supporting his observations by conducting experiments, option 1 is incorrect. Option 2 correctly mentions the slight humour that comes across while reading this passage. Retain it. Option 3 is not related to the author's writing while no tragedy has been mentioned in the passage. Hence, [2].

22. As per the last sentence of the third paragraph, many officials were selected through the examination system. Hence, [2].

23. As per the second paragraph, the statesmen of the Restoration did not want to create a new society but wanted to restore the traditional society under new conditions. Thus option 1 correctly mentions the primary objective of the Restoration. Hence, [1].

24. As per the last sentence of the first paragraph – Thus, the only common area of agreement between European and Chinese conservatism is the intent to conserve – only the aim of conserving is common between Chinese and western conservatism. Thus option 1 is correct. Retain it. Though Chinese conservatism developed during the Taiping Revolution, it is not a similarity between the Chinese and western conservatism. Negate option 2. As per the penultimate sentence of the first paragraph, western conservatism distrusts cosmopolitanism while Chinese conservatism defends rational cosmopolitan order. Thus option 3 is also incorrect as cosmopolitanism is not a point of similarity between the two. Nothing has been mentioned in the passage about Chinese conservatism being land oriented. Thus option 4 can also be negated. Hence, [1].

25. Tung-chin is the name of the Restoration period while I.Ching and Buddha are not mentioned in the passage at all. Hence, [4].

26. As per the second paragraph, the main aim of the Restoration was to revive old institutions and restore them to their original vitality so that a society based on tradition, but under new conditions, could be created. Thus only option 3 correctly answers the question. Hence, [3].

27. According to the third sentence of the first paragraph, western conservatives intended to preserve Christian and aristocratic elements in European society. Also, the penultimate sentence of the same paragraph states that western conservatism believed in the sacredness of private property and distrust of cosmopolitanism. Thus all except 'cosmopolitanism' was intended to be preserved by the western conservatives. Hence, [3].

28. The Chinese examination system is only mentioned in the last paragraph of the passage. Thus it is not an appropriate title for the passage. Negate option 1. The first two sentences clearly state the aim of the author in writing this passage. Thus option 2 is an appropriate title for the passage. Retain it. Only the third paragraph mentions how the officials rose to prominence. Thus it is not the main purpose of the author in writing this passage. Negate option 3. The Taipei Rebellion has been mentioned in the first paragraph in order to show when Chinese conservatism began. However, the passage does not imply that Chinese conservatism was an effect of the Taipei Rebellion. Thus option 4 can also be negated. Hence, [2].

VA-1.5 | ARTICLES AND PARTS OF SPEECH

PRACTICE EXERCISE 1

1 to 5: In all the given sentences the article required is 'a' as the things or persons spoken of are all indefinite, i.e., they are not any particular person or thing, they could be any person or thing. Hence, the rule of indefinite articles has to be applied. Note that the article does not change with the gender of the noun (so, 'a girl', 'a small boy'). Also, the indefinite article is always followed by a singular noun.

6 to 9: In all the given sentences the article required is the indefinite article 'an'. We use 'an' before a word beginning with a vowel (a, e, i, o, u) sound. Here also the rule of indefinite articles has to be applied as the person or thing spoken of is not a particular one. Again, there is no plural form of the indefinite article 'an'.

10 to 14: In all the given sentences the article required is 'a'. We use 'a' before words beginning with a consonant sound in spite of their spelling beginning with a vowel. In all the above sentences words (union, university, U.S.) begin with a consonant sound, that of 'yu' and the word (one) starts with a consonant sound, that of 'w'. The choice of article is actually based upon the phonetic (sound) quality of the first letter in a word, not on the written representation of the letter. If the first letter makes a vowel-type sound, we use 'an'; if the first letter would make a consonant-type sound, we use 'a'. Here also the rule of indefinite articles has to be applied, as the person or thing spoken of is not a particular one.

15 to 18: In all the given sentences the article required is 'an'. We use 'an' before words beginning with a vowel sound in spite of their spelling beginning with a consonant. In all the above sentences the words (hour, honest, heir) begin with a vowel sound, as the initial consonant 'h' is not pronounced.

19 to 23: In all the given sentences the definite article 'the' should be used. When we speak of a particular person or thing, or the one already referred to, we use 'the'. In all the sentences above a particular thing or person is spoken of, hence the rule of definite articles has to be applied.

24 to 26: In the given sentences no article is required. Uncountable nouns (things that cannot be counted, for example concepts like life, happiness, knowledge, etc) are not preceded by indefinite articles.

27 & 28: The definite article 'the' should be used in the given sentences. The definite article 'the' is used when a singular noun is meant to represent a whole class. The nouns in the sentences are singular and they represent the whole class.

29: No article is required in the given sentences. When 'man' is used in the general sense to denote the whole class, no articles are used before it.

30 to 33: In the given sentences the article required is 'the'. 'The' is used with the names of gulfs, rivers, seas, oceans, groups of islands and mountain ranges.

34 & 35: The article required in these sentences is 'the'. We use 'the' before common nouns, which are the names of unique things, like the sun, the moon, the sky etc.

36. Both the sentences are correct. In A there is no need to use an article before 'honest' because when we refer to abstract ideas in a general sense, the abstract noun is not preceded by an article. We use an article before an abstract quality when it qualifies a person and since, 'honest' begins with a vowel sound, the indefinite article 'an' has been used correctly in B. Hence, [3].

37. Sentence A is incorrect: 'source' should be preceded by the indefinite article 'a'. The indefinite article is generally used before singular countable nouns. But in some cases uncountable nouns can also be preceded by indefinite articles, e.g., a source of strength, a good night's sleep, a working knowledge of mathematics, etc. In the second sentence, the definite article 'the' before 'source' is correct because it refers to a particular source. Hence, [2].

38. There is no need to use an article when we talk of things in general. In A the reference is to 'people' and 'homes' in general. So, the sentence is correct. In B the reference is to a particular group of people – the ones who have been displaced by the flood, so in this sentence the definite article 'the' should precede 'people'. Hence, [1].

39. An important rule about article usage is that we sometimes use the article depending on the context. When a place like school or hospital is visited for its primary purpose, the article before the word is eliminated. But when the place is visited by someone for some other purpose, the article 'the' is used. In A, the patient visits hospital for its primary purpose, i.e., treatment, so 'reached hospital' is correct, whereas in the second sentence the students went to the hospital to distribute gifts, so 'the hospital' is correct. Hence, [3].

40. 'Advice' is an uncountable noun and we do not use an indefinite article before an uncountable noun. So, sentence A should read '...he gave me advice on' or '...he gave me some advice on'. In B, since 'piece' qualifies the uncountable noun 'advice', the indefinite article 'a' before 'piece of advice' is correct. Hence, [2].

41. When we use an adjective to talk about a group of people or the entire class, we use the definite article 'the' before the adjective, for example, 'the unemployed' meaning all the unemployed people as a group. Here the adjective 'homeless' actually represents the group of people who have been rendered homeless. So, both the sentences require 'the' before the word 'homeless'. Hence, [4].

42. We normally use 'the' with the names of buildings, except if the first name is the name of a place. Therefore, 'The White House' and 'trip to Buckingham Palace' are correct. Hence, [3].

43. When we talk about the location of a place within another place, we use 'the' with the words stating direction like, north, south, east and west. But when we compare the locations of two places, we do not use 'the' with the words stating direction. Therefore, in A, the correct expression should be '...Maldives is south of India...'. B is correct because it shows Scotland's location within Great Britain. Hence, [2].

44. When an abstract noun is used in a general sense, the noun is not preceded by an article. 'Life' in A refers to the general condition of human existence; hence it does not require an article. In B, the reference is to a particular aspect of existence, so 'the life of a farmer' would be correct. Hence, [1].

45. Both the sentences are correct if the context in each is different. In A, the repetition of the articles is justified if the manager and the floor supervisor are two different people. In B the manager and floor supervisor is one person who performs the two roles. Hence, (3).

46. Both the sentences are incorrect. In certain phrases consisting of a transitive verb followed by its object (as in A), the article is omitted. So, A should read: '...Pompey planned to give battle the next morning'. Similarly, in certain phrases consisting of a preposition followed by its object (as in B), the article is omitted. So, B should read: '...while on horseback'. Hence, [4].

47. In A, the use of the indefinite article before 'word' is correct. Here it conveys the original numerical sense of one. 'The cholera epidemic' and 'the village' are also correct phrases as the reference is to a particular epidemic and a particular village. In B, the definite article before the noun 'job' is used for the sake of emphasis, to give the expression of a superlative. So, both the sentences are correct. Hence, [3].

48. Some nouns can be both countable and uncountable. In A, 'coffee' is used as a countable noun – a cup of coffee – hence, the article 'a' before it is correct. In B, 'coffee' is an uncountable noun and refers to the entire produce of coffee. Hence, no article is required before it. So, both the sentences are correct. Hence, [3].

49. Sentence A is correct because we use the definite article 'the' before names of months, days or weeks when we refer to particular days/months/weeks. When we refer to months or days in an indefinite manner, we do not use any article before them. So, B should not have 'the' before Monday. So, only A is correct. Hence, [1].

50. An article is not used when a transitive verb is followed by its object; so 'to lose heart' is the correct expression. An article is not used in certain phrases consisting of a preposition followed by its object, so 'at home' is also correct. Hence, [3].

PRACTICE EXERCISE 2

1. Agree – The word refers to the action of consenting; hence it is a verb. A verb is a word used to express an action or a state of being.

   Helper Verbs: The verbs *be (am, is, was, are, were), has, have, does* and *did* when used with ordinary verbs to indicate tenses, passive forms, questions and negatives are called *auxiliary verbs* or *auxiliaries* or *helper verbs*. Some other helper verbs, also known as *modal auxiliaries*, are *can, could, may, might, shall, should, will, would, must, ought, used (to), need, dare*. These verbs express the modality of the main verb.

   Transitive & Intransitive verbs: Transitive means *passing over*. The action denoted by the verb passes over from the doer or subject to some object. E.g., The boy *ate* a biscuit. (You ask the question *what to* the verb. If you get an answer, it is a transitive

verb.) Intransitive means *not passing over*. The action denoted by the verb does not pass over from the doer or subject to an object. E.g., The girl *cries* softly.

2. Single – The word actually gives us more idea about the nomination, i.e., it qualifies the noun. It is, therefore, an adjective. An adjective is a word, which describes or modifies a noun or a pronoun.

3. Nomination – This is the name of an idea, hence a noun. Therefore, a noun is a word used to name a person, thing or idea.

4. For – This word shows the relation between two nouns in the sentence, 'nomination' and 'position', so it is a preposition. A preposition is a word used to show the relationship of a noun or a pronoun to another word in the sentence.

5. Ago – The word means 'in the past time' and qualifies the adverb of time 'long'; thus 'ago' is an adverb. An adverb is a word used to modify a verb, an adjective or another adverb.

6. Alas – This word does not serve any particular grammatical function. It is just used as an exclamation and can stand alone; therefore, it is an interjection.

7. Them – This word actually replaces the noun 'countries', hence it is a pronoun. A pronoun is a word used in the place of a noun or nouns. The noun that a pronoun stands for is called its antecedent.

8. And – This word acts as a link between the two clauses; hence it is a conjunction. A conjunction is a word used to join words or groups of words.

9. In A, 'like' qualifies the noun 'minds' and means 'of the same kind and character'. It does the work of an adjective (II-A). In B, the word 'like' links 'your dress' with 'mine'. Thus, it does the work of a preposition (IV-B). In C, the word 'like' refers to a kind or sort and is used to name the kind. It is used as a noun here (I-C). In D, 'like' indicates an action and does the work of a verb (III-D). So, the sequence is I-C, II-A, III-D, IV-B.

10. In A, 'after' is used as an adjective as it qualifies the noun 'years' (IV-A). In B, 'after' connects two independent clauses, hence it is a conjunction (III-B). In C, 'after' shows the relation between the two nouns 'life' and 'death'; thus it is a preposition (II-C). In D, 'after' qualifies another adverb 'soon' and they both qualify the verb 'reach'. So, after is used as an adverb (I-D). So, the sequence is I-D, II-C, III-B, IV-A.

11. In A, the word 'fast' is used as a noun and refers to the act of keeping away from food (III-A). In B, 'fast' qualifies the noun 'colour-bases' and hence is an adjective (I-B). In C, the word indicates an action, hence it is a verb (IV-C). In D, 'fast' qualifies the adjective 'asleep', hence it is an adverb (II-D). So, the sequence is I-B, II-D, III-A, IV-C.

12. In sentence A, 'well' is an interjection used to introduce a sentence or resume a conversation (IV-A). In B, 'well' modifies the adjective 'behave', hence it is an adverb (I-B). In C, 'well' indicates the act of springing or gushing, hence it is a verb (III-C). In sentence D, 'well' is an adjective as it qualifies the pronoun 'she' (II-D). So, the sequence is I-B, II-D, III-C, IV-A.

13. In sentence A, 'past' refers to the history of the country and is used as a noun (III-A). In B, 'past' qualifies the verb 'marched' and hence is an adverb (IV-B). In sentence C, 'past' indicates direction and connects the two nouns 'house' and 'post office'. So, it is a preposition (I-C). In D, 'past' qualifies the noun 'presidents' and is an adjective (II-D). So, the sequence is I-C, II-D, III-A, IV-B.

14. 'Out of slump' in C is incorrect because it is missing an article. In D, 'a temporary stimuli' is wrong as stimuli' is a plural word. The correct word in E should have been 'effect' (noun) and not 'affect' (verb). There is no glaring error in A but as the only option left is B, (5) must be the answer. Hence, [5].

15. As an adjective, 'down' implies 'of or relating to a train(s) from a more important place or one regarded as higher.' Thus, 'down' is used as an adjective in D. As a preposition, 'down' implies 'in a descending direction'. Thus, 'down' is a preposition in A. As a noun, 'down' means 'a downward movement or descent'. So, it is used as a noun in B. When 'down' is used as a verb, it means 'to throw down or subdue'. So, 'down' is a verb in C. Thus, the correct order is I-D, II-A, III-B, IV-C. Hence, [1].

16. The easiest match than can be made is I-D. In D 'above' describes the information. This narrows down the options to [1] and [3]. The only possible noun usage is in A, though it makes sense only if 'above' is taken to mean 'heaven'. Both B and C use 'above' as a preposition. So, actually there is no perfect answer. As [1] contains three correct matches, it can be marked as the answer. Hence, [1].

17. There can be no confusion about 'MBA' being a noun (it is preceded by 'the'), 'it' being a pronoun, 'helps' being a verb, etc. The deciding word is 'tackle', which is also clearly a verb. Hence, [5].

18. In A, 'witness' is a verb as it is an action word and in B it is a noun.

19. In A, 'more' qualifies 'time'; hence it is an adjective. In B, 'more' is part of the adverbial phrase 'any more', which modifies the verb 'stand'; hence it is an adverb.

20. In A, 'neared' is the action of reaching his death and so it is a verb. In B, 'near' qualifies the verb 'come' and so it is an adverb.

21. In A, the pair of 'neither...nor' joins two clauses, hence it is a conjunction. In B, 'neither' stands for 'not one' and does the work of a pronoun.

22. In A, 'that' points out the object it refers to and is used as a demonstrative pronoun. In B, 'that' is used with the noun 'dress' and it qualifies the noun, hence it is an demonstrative adjective. In case of confusion, remember, the easiest way to distinguish between a demonstrative pronoun and a demonstrative adjective is that the former is followed by a verb whereas the latter is followed by a noun.

23. In A, 'even' is used to show that something is surprising or unusual and it qualifies the verb 'know'; so it is an adverb here. In B, 'even' is an adjective meaning 'leaving no balance of debt on either side'.

24. In A, 'while away their time' implies spending time in a relaxed manner and so 'while' is a verb. In B, 'while' means 'although' and it joins two clauses in the sentence. So, in B, 'while' is used as a conjunction.

25. In A, 'up' implies that prices have increased; hence it is used as a verb. 'Up' in sentence B is a preposition as it placed before the noun 'mountain' and shows the relation between the pronoun 'us' and the noun 'mountain'.

26. In A, 'wrong' qualifies the verb 'led'; hence it is used as an adverb. In B, 'wrong' is used as a noun and names the act of injustice meted out to the innocent people.

27. In A, 'high' is an adjective that means 'expensive'. In sentence B, 'high' is adverb noun that means 'peak'.

28. There is an incorrect word form in part (3). We need a word to qualify the noun 'techniques'; therefore, the adjective 'innovative' should be used in place of the noun form 'innovation', to make the sentence correct. Hence, [3].

29. The error is in part (1). Since similar items are mentioned, the gerund 'borrowing' should be used to make it similar to the word 'lending'. Hence, [1].

30. The error is in part (1). The latter part of the sentence indicates that something is being compared to a 'tourist'. So, in part (I) we need a noun indicative of a person. Thus, 'reader' should replace 'reading' in order to make the comparison meaningful. Hence, [1].

31. There is an incorrect word form in part (I). The adverb 'badly' has been incorrectly used after the verb 'felt'. Actually, we need an adjective here which should modify the pronoun 'we'. Therefore, the adjective 'bad' should be used in place of 'badly' to make the sentence correct. Hence, [1].

32. There is an incorrect pronoun form in part (4). The sentence indicates that the three people are subjects i.e. are doing the action Therefore, the pronoun should be in the nominative case, i.e., 'he', to make the sentence correct. Hence, [4].

33. The error is in part (4). We require a reflexive pronoun here to indicate that the action has happened on the doer. So, 'he hurt himself' will be the correct phrase. Hence, [4].

34. There is an incorrect word usage in part (2). 'Therefore' means 'for that reason' but the sentence indicates that apart from reading books, the speaker also watches movies. Therefore, the appropriate word should be simply 'and'. Hence, [2].

35. There is no error in the sentence. A relative pronoun describes the preceding noun in such a way as to distinguish it from other nouns of the same class. 'That' is a specific relative pronoun that tells us specifically which men the stories were about. Hence, [5].

36. The error is in part (4). We need the gerund 'shouting' in place of 'shout' because it follows the preposition 'by'. A gerund is a noun formed from a verb by adding 'ing' to it. Hence, [4].

37. The error is in part (4) of the sentence. The adverb form 'awhile' is incorrectly used after the preposition 'for'. As an object of the preposition, the noun phrase 'a while' is correct. Hence, [4].

38. Here *precision* is the name of an attribute. Hence, [2].

39. In the given sentence, the word *blessed* signifies the quality of the noun *light*, so it is an adjective. Hence, [2].

40. *Honour* is the name of a particular quality. Hence, [1].

41. The underlined word indicates an action. Hence, [3].

42. *But* is otherwise a conjunction. Here it means *with the exception of* and is used as a preposition. Hence, [2].

43. The underlined phrase is actually a group of words used with the force of a single preposition. It shows the relation between the noun *services* and the facility that the musician has got. Hence, [2].

44. Here *boost* is a verb because it denotes an action. Hence, [4].

45. *Peaceful* is an adjective, which qualifies the noun *environment.* Hence, [2].

PRACTICE EXERCISE 3

1 & 2: Sometimes 'the' is placed before a common noun to give it the meaning of an abstract noun. Like, in the given sentences 'the fighter in him' means 'the spirit like that of a fighter', 'the businessman in him' means 'the spirit like that of a businessman'.

3 & 4: We use 'the' before a proper noun only when it is qualified by an adjective or adjectival clause. Here the reference is to a particular 'Mr. Sharma' and a particular 'Milton'.

5: We do not use articles before the names of individual mountains or islands.

6 to 8: We use 'the' with adjectives when they are in superlative degree of comparison. In all the above sentences 'the' is required before 'prettiest', 'most intelligent' and 'best'.

9 & 10: We normally do not use articles before the names of illnesses. So no article is required before 'jaundice'. Before 'headache' or cold' we use 'a'. So, 'a bad headache' is appropriate for sentence 10.

11 & 12: The article required in the given sentences is 'the'. The definite article 'the' is used before ordinals, i.e., first, second, third, etc.

13 & 14: The article required in the given sentences is 'the'. use 'the' before the names of musical instruments.

15 & 16: In the given sentences 'the' is required. We use 'the' before an adjective when it is used as noun to represent the whole class. 'Rich' refers of the entire class of rich people; it is the same case with 'weak'.

17 & 18: In the given sentences the article required is 'the'. We use 'the' before an adverb in case of comparatives.

19 & 20: Articles are omitted before abstract nouns used in the general sense, as in these sentences.

21 & 22: No article is required in the given cases. We do not use articles before the names of languages.

23 & 24: The article 'the' is required in the sentences. When we refer to nationalities as an entire class, the article 'the' is used before the names.

25 to 27: No article is required in the given sentences. Articles are not used before school, college, church, hospital etc. when these places are visited for their primary purpose.

28 & 29: Articles are not used before names of materials. Hence no article is used in the given sentences, as silver and petroleum are names of materials.

30 to 32: No article is required in these cases. We do not use articles before names of continents, countries, states, cities, towns etc. The exceptions are proper nouns such as United States of America and United Kingdom as they are descriptive names.

33 to 35: When a proper noun is considered a common noun, thereby highlighting the quality associated with the person, an article is used before the proper noun. 'The Shakespeare' indicates the extraordinary literary ability of Shakespeare, 'The Florence Nightingale' indicates the extreme care and concern displayed by Florence Nightingale and, in sentence 70, the oppressive qualities of Hitler are highlighted.

Some other concepts are given below.

- 'The' is placed before the names of holy books. For example, 'the Bible' and 'the Quran'
- No article is required before plural common nouns that are used in the general sense. For example, 'tigers are dangerous' and 'men are often insensitive to women's feelings'.
- No article should follow the phrases 'kind of' and 'sort of'. Many students incorrectly place 'a' after these phrases.
- Indefinite articles do not precede substances (that are uncountable) unless another countable noun is between the two. For example, 'a bottle of milk' and 'an ounce of sugar'.
- Articles don't precede names of meals. For example, 'let's have dinner' and 'will you meet me for lunch tomorrow?'

36. The first and second blanks introduce 'a wolf' and 'a lamb'. Thus, indefinite articles will be used to fill the blanks. Since the lamb has gone astray from a particular fold, we need to use the definite article 'the' in the third blank. The wolf and the lamb have already been introduced and we are referring to those particular animals only. Hence, 'the' is used for both the last two blanks. Thus the correct sentence is: '*A* wolf, meeting with *a* lamb astray from *the* fold, resolved not to lay violent hands on him, but to find some plea to justify to *the* lamb *the* wolf's right to eat him'. Hence, [1].

37. The first blank will have an indefinite article as we are not talking about a particular 'bat' but just introducing it in the sentence. 'Ground' will be preceded by 'the' as it represents a particular locality in relation to the bat. 'A' is used in the third blank as we are introducing a new character i.e., 'weasel'. 'The' is used in the fourth blank and sixth blank as we have already mentioned the weasel and bat respectively. Since 'enemy' represents a class of animals, 'the' is used to fill the fifth blank. In the next part, 'bird' and 'mouse' are used in a general sense, and do not refer to particular individuals. Thus, an indefinite article precedes these singular countable nouns. The correct sentence is: '*A* bat who fell upon *the* ground and was caught by *a* weasel leaded to be spared his life. *The* weasel refused, saying that he was by nature *the* enemy of all birds. *The* bat assured him that he was not *a* bird, but *a* mouse, and thus was set free'. Hence, [4].

38. Only option [1] is grammatically correct. In options [2] and [3] the use of definite article 'the' before common nouns 'house' and 'street' is incorrect. 'House' in the latter part of option [4] should be preceded by the definite article, as it has already been mentioned in the first part of the sentence and a specific house –'old house' is being spoken of. Hence, [1].

39. B is wrong because it should be 'rarely has the economic ascent .... been watched' rather than 'rarely .... has been watched'. C is wrong: it should be 'the post war era'. Only A and D are correct. Hence, [2].

40. In sentence A, there is a spelling error. 'Immigrant', not 'imigrant', is the correct spelling. Sentence C has a punctuation error, as it requires a comma at the end. Sentence D needs the article 'a' before 'owner of dry goods business'. Sentence E has a tense error: it should be 'would later become', not 'would later became'. So, only B is correct. Hence, [1].

VA-1.6 JUMBLED PARAGRAPHS AND ODD SENTENCE

PRACTICE EXERCISE 1

1. One can easily get the BC link since 'they' in statement C refers to the people covered under the National Rural Guarantee Scheme mentioned in statement B. Statement A logically fits in as the concluding statement since it talks about the criticism and carries the thought further. Thus, the correct order is BCDA.

2. Statement D is the first sentence as it mentions how a company is entering into alliance as if there is no tomorrow. This should be followed by statement C as 'that' in statement C refers to the company's alliances and also mentions the name of that company i.e. Elder Pharmaceuticals. 'Hurry' seems to be a trait associated with a company that is fast growing. Statement A records the various products that the company markets and flows from statement B. So the correct order is DCBA.

3. Statement C should be the opening sentence because it gives the general opinion and the spread of modernization. The other sentences follow from this hypothesis and try to validate the fact stated in statement C. Statement A follows from C. The BD link is the most crucial one, with the word 'industries' connecting the two. Thus, the correct order is CABD.

4. The paragraph talks about the importance of time in our lives. Hence, the logical flow of sentences would be ADCB i.e., firstly what is time, secondly how much time do we all have in our lives, then how do we spend most of our time and then how we miss out on the precious time by indulging in wasteful things. Thus the correct order is ADCB.

5. Statements A and C both seem plausible as the opening sentence. The most obvious link in the sequence is the DB link because of the quantifiers 'partly' and 'mostly'. Statement B must follow statement D and not the other way round because the partial reasoning should be followed by the complete reasoning. Thus the correct order is CADB.

6. Statement B cannot be the opening sentence because of the word 'ultimately', which requires some kind of a precedent. Statements C and D both seem to be appropriate opening sentences. Statement C should follow statement D because statement C elaborates the idea stated in statement D. Our susceptibility towards easy abstractions leads to our tendency to simplify discordant things in our daily lives. Statement A takes the idea further by giving the example of India, hence it is the last sentence in the sequence. So the correct sequence is DCBA.

7. Statement C is the opening sentence of the paragraph as it states the reason why countries adopted national anthems – which is the main topic of the paragraph. This should be followed by statement B as it states one of the oldest national anthem. Here the BA link is obvious, as statement A refers to some unusual aspect of the song mentioned in statement B, thus providing us with the BA link. Also, statement D follows by way of contrast describing the common and typical aspects of the national anthem. Thus the correct sequence is CBAD.

8. Logically speaking, either statements A or C have to be the first sentence of the paragraph. On reading the sentences, we realize that there is a clear AB link as statement A mentions 'the patch' while statement B states how this patch helps. The CD link is also clear as statement C mentions how not all nicotine is bad while statement D states the uses of nicotine. Since the entire paragraph is about nicotine and it uses, it makes sense for the CD link to come first followed by the AB link. Thus the correct order is CDAB.

9. Statement C has to follow A, because of the contrast between the two. Since the author is referring to a joke in statement A, only statement B can precede it as the author wants to know if she is serious about the comment mentioned in statement B. Statement D is then the last sentence of the paragraph as it explains why the speaker asked such a question about Bill Gates. Thus the correct order is BACD.

10. Since the paragraph is about shopping for gold, statement C is the opening sentence of the paragraph. This should be followed by statement D as it mentions why people do not consider shopping for gold as spending but investing. You will see that

statement A has to follow statement D: 'While this may be true' has to refer to the belief expressed in statement D. Statement B is the last sentence of the paragraph as it states how the Dubai gold trade is making shopping for gold even more exciting. Thus the correct sequence is CDAB.

11. 'His study' in B refers to 'Gregory King's statistical study in statement 1. 'Of these' in statement D refers to 'five million men' in statement B. The next figure is given in statement A ('hundred thousand'). Statement C gives a favourable picture and then 6 shows a contradiction with the use of 'but'. So the correct sequence is BDAC.

12. Statement B should follow statement 1 because 'this' in statement B refers to the prediction of 'International organizations'. The BD link is also very clear: 'this optimism' refers to the hope that India's progress will happen as predicted. AC is a more plausible link than the CA link because of the 'not merely... also' construction. Moreover, why India is the 'youngest nation' (as stated in statement C) is explained by 6. So the correct sequence is BDAC.

13. The 1A link stands out. 'Charles was absolutely honest' in statement 1 is qualified by 'He described what he believed to have happened' in statement A. The DC link can be perceived too. The BD link can be explained: 'Miss Schlegel had lost her nerve, as any woman might' in statement B is qualified by 'She had been got safely into the other car' in statement D. Thus the sequence is ABDC.

14. Statement A links to statement 1, as it contradicts what is stated in statement 1, using 'yet'. Roh's poor run in the elections mentioned in statement A is supplemented with an example mentioned in statement D. Then, again, there is a link in CB. The victory mentioned in statement B naturally results in his becoming President, as mentioned in statement 6. Thus, the correct sequence is ADCB.

15. 'Immigration officers encircled a building' in statement 1 indicates that they are looking for illegal immigrants, which is mentioned in statement C. There is a CB link as statement B mentions the number of undocumented workers found. This should be followed by statement D as it mentions how people are willing to volunteer to root out these illegal immigrants. Statement A is linked to statement D with the phrase 'harsh as all that sounds' which implies that people were being irrational to root out immigrants. Statement 6 follows from statement A as the last part implies that Malaysia is beginning to take a more rational approach to migrants labour while statement 6 states how the country was fighting a losing battle against illegal immigration. Thus, the correct sequence is CBDA.

16. Statement 1 talks about computers being an integral part of spacecrafts. This should be followed by statement D as it mentions the various uses of computers in spacecrafts. Since statement A mentions a contrast idea of the first manned spacecraft not carrying any computers, it should follow statement D. Statement C chronologically follows statement A as it states how for nearly fifteen years, no computers were used in space missions. The CB link cannot be overlooked on account of the 'yet now' contrast it presents. Statement B is linked to the last sentence by the word 'both'. So statement B should precede statement 6. Thus the correct order is DACB.

17. Statement C begins the sequence as it specifies Maupassant's 'consistent but honest vision' (grim, bleak,. .). Statement B further explains how Maupassant depicted the human spirit. Statement D gives an example of his writings in the Boule de suif episode. Statement A must follow statement D to continuethe Boule de suif episode, which concludes in statement 6. Thus the correct sequence is CBDA.

18. Statement B explains the issue talked about in statement 1 and hence must be the opening statement. This is followed by statement A which poses another question. Statement D continues the same line of thought as in statement A. Statement C links to statement 6, which asks if the distinction stated in statement C is really valid. Thus the correct order is BADC.

19. Statement C qualifies best as an opening sentence: it links to statement 1, which specifies lifeguards' limitations, and also provides a possible solution. Statement A goes on to elaborate the working of the computerized system. Statement D continues this line of thought. Statement B links to statement 6, as they both mention two alternative scenarios that the computer has to distinguish between. Therefore, the correct sequence is CADB.

20. BD is the first link. It states that though life may have improved for frequent travellers they still have to put up with the mysterious rules of mileage programmes. AC is the next link since

'the selling point' mentioned in statement A is explained in statement C. Statement C then links to statement 6, as the former mentions what the airlines promised, while 6 shows how that promise is not fulfilled in reality. Thus, the right sequence is BDAC.

21. [2] is a better option to start the paragraph as it indicates why the major powers are increasing their engagement with the Modi government. It should be followed by [3] as it states that the Russian Deputy Prime Minister visited India before the British Foreign Secretary. 'This guest from Moscow' in [1] is clearly talking about Dmitry Rogozin. Though [4] also talks about the British (so it can be connected to [2]), it cannot connect to the other two statements. Hence, [4].

22. Though [4] is a decent opening sentence, it does not fit contextually with the remaining sentences as they do not talk about the role of Governors. [3] is thus a better opening sentence than [4]. 'It' in [2] refers to the new government and also gives an idea as to how the new government could make use of the Sarkaria Commission recommendation. This should be followed by [1] as it mentions what the new ruling Alliance is doing instead. Hence, [4].

23. [3] is the first sentence in the paragraph as it reports the incident of sprinter Dutee Chand and points to the problems faced by sports and sportspersons in this country. It is followed by [4] as it mentions 'this incident'. [2] continues in the same manner of reasoning and further highlights the failures of the system. The tone in [1] is more positive as compared to the rest of the sentences and talks about androgen levels which are not mentioned in any other sentence. Hence, [1].

24. [4] talks about the implications of human extinction and [3] continues that point. [2] concludes that it is thus necessary to prevent the threat of extinction from becoming a reality. [1] is in contrast to the other sentences as it claims that a potentially hazardous threat is not worth worrying about. Hence, [1].

25. [2] opens the paragraph by stating what toleration is concerned with. [1] discusses the condition that needs to be met for something to be called toleration instead of cowardice or weakness. [3] clarifies that condition. [3] mentions when toleration occurs, thus, they make a connected paragraph. [4] is not an example of the point that the other three sentences are trying to make. An appropriate example would be one in which a person has the ability to negate something but chooses not to. Hence, [4].

26. [3] introduces the subject of the New Development Bank and India's role in setting it up. [1] continues the topic of India's role in setting up this bank. [2] is the result of India's stand in this project. Though [4] talks about the BRICS nations, it is in no way related to the setting up of the bank. Hence, [4].

27. [2] introduces the subject of Polavaram and mentions the problems involved. This will be followed by [3] and [4], as [3] mentions land submergence while [4] talks about the exact area of land that will be submerged. Sentence [1] talks about Telangana and doesn't mention Polavaram. Hence, [1].

28. [1] talks about the daily bloodshed in Gaza. [4] goes on to mention that even those who accept Israel's right to defend itself would be shocked by the ongoings. [3] mentions why that particular house was attacked (the police chief of Gaza City was hiding in that house). These three sentences condemn Israel's actions but the tone of [2] is the opposite. Hence, [2].

29. Sentences [4]-[3]-[2] talk about the problems associated with minority shareholding whereas [1] suggests a mandate. Hence, [1].

30. The correct sequence is [2]-[1]-[4]. These three sentences are related to 'organising information'. [3] mentions a 'debate' about memory, which does not link to any of the other sentences. Hence, [3].

PRACTICE EXERCISE 2

1. Only statement B mentions the full name of the video game. Thus it is the first sentence of the paragraph. There is a clear CA link as statement C mentions Sony Playstation and Sega Saturn as the rivals of the N64 while 'both companies' in statement A refer to these companies. After reading D, it is obvious that 'the company' in statement D refers to Nintendo and also states the reason why parents are frustrated and why sales clerks are exhausted. Thus the correct sequence is BDCA.

2. The first statement is clearly C (you don't need to be a cook to figure this out!), as it is the only standalone sentence. This should be followed by statement A as it asks you to mix all the ingredients mentioned in statement C. The phrase 'mix well again' implies that we need to mix again after adding sugar. Statement D is the last sentence as it states that all the steps have been completed and the mixture can be chilled until set. Thus the correct sequence is CABD.

3. Only statement D can start the paragraph – all the others follow after some other statement, for example, 'this chemical compound' is obviously after some statement referring to a chemical compound, and so on. Since statement D mentions that Indal was adding value to alumina, statement C comes next because it mentions that 'special alumina' had to be imported and Indal started developing this import substitute. 'This chemical compound' in statement A clearly refers to special alumina and gives us more information about the uses of special alumina. Statement B is the last sentence as it mentions how the technology required for making special alumina was developed in the Belgaum centre. Thus the correct order is DCAB.

4. The paragraph cannot logically begin with statement A. Statement B can be the opening statement as it introduces the topic. Statement C logically follows statement B as the former mentions 'this precious resource' which refers to the oil in statement B. Statement D has to be the concluding sentence and 'therefore' is an indicator. Statement A can follow statement C as it the latter mentions how more energy will be taken from available sources while the former states that it will need more investment. Thus, the correct sequence is BCAD.

5. In this example you can directly spot statement D as a possible concluding sentence. The minister could not have viewed the garland of currency notes before opening the box, thus there is a BA link. This leaves us with statement C which is the first sentence of the paragraph as it mentions why the RBI governor had a box in his hand. Thus the correct sequence is CBAD.

6. The AC link makes sense because the word 'now' in statement C logically links to statement A. Statements B and D flow directly from statement C. The BD link is clear as statement B mentions the vies of one of the organizers of the fair while statement D follows statement B because of the phrase 'also pushing for' which implies that besides encouraging people to grow mulberries, the Fair is also pushing for an accreditation. Thus the correct order is ACBD.

7. The AC link can be established because statement C talks of the two compositions mentioned about in statementA. Statement B continues about the *Eroica symphony*. Statement D is obviously a development from statement B. Statement A has to be the opening sentence because it introduces the topic of music and the two compositions. Thus the correct sequence is ACBD.

8. The BD link is the most obvious one because 'such a thing' in statement D refers to the activity mentioned in statement B. Statement A should follow statement D as latter mentions transgression and the former states the kind of transgression it is. Statement C summarizes the idea and also carries the idea forward. Thus, the correct sequence is BDAC.

9. The CB link stands out, as statement C talks about the relevance of physical force in the lives of primitive savages and makes a contrast by talking about how physical violence in industrial civilizations is not really justified. Statement A is the opening sentence, as it introduces the topic of physical force and gives a general view of the role it plays in organized society. Statement D continues the theme by stating the consequence of physical violence when it becomes the 'ultimate arbiter'. Thus, the correct sequence is ADCB.

10. Statement A is the opening sentence, as it introduces the topic of discovering the possibilities of using recycled water. The BC link can be established, as statement B describes how water is purified by the recycling system and statement C states that 'public health officials vouchsafe for the purity and safety' of such recycled water. Statement D follows next by stating a contrast that the use of recycled water should be encouraged except for the purpose of drinking. Thus, the given sequence ABCD is the correct one.

11. [3] talks about ongoing protests over the *dhoti* in Tamil Nadu. [2] talks about some good that has come out of this incident and [4] explains it further. [1] does not fit anywhere in the paragraph. Hence, [1].

12. [1] is the beginning sentence of the paragraph as it talks about the way Archie will die. This is followed by [4] that connects to [1] using 'therefore'. [3] comes next as it starts elaborating on social problems of the US. Though [2] also talks about Archie's death, it starts a new sub-topic, as it talks about the life of his kith and kin one year after the tragedy. Hence, [2].

13. [1] is the correct introductory sentence as it introduces the idea of comparing abstract art with literature. This is followed by [4] as it compares the Edgar Allan Poe's poems with a painter's brush strokes. [3] further continues the same idea to show how an abstract painter can experiment with unusual colours to portray the mood that he wants to portray. The introduction of photography in [2] is out of context. Hence, [2].

14. [2] is the opening sentence of the paragraph as it explains the beginning of the Surrealist movement. This is followed by [3] and [1] as they express its beliefs. [4] mentions some famous artists and doesn't belong to this paragraph. Hence, [4].

15. [2] states Nietzsche's philosophy of listening to music with our muscles. It is exemplified in [4]. [1] states that all these actions can occur without our knowledge or volition. Though [3] talks about a philosopher too, it cannot connect with any other sentence except [2]. Hence, [3].

16. [3] explains how our brains change when we learn a new task. [2] supports this statement by mentioning that the brain is flexible even after a particular age. [1] further strengthens the argument. [4], which explains how our brains coordinate a complex set of actions, does not fit with the other sentences. Hence, [4].

17. [4] is the opening sentence of the paragraph as it defines what a 'group' is. It is followed by [3] and [1], which mention shortcomings of the definition. [2] talks about the importance of the definition and is too positive to fit with [3] or [1]. Hence, [2].

18. [2] recommends actions based on a premise. [4] and [1] ask questions that man will be faced with while undertaking those actions. [3] asks a completely different question as compared to [3] and [1]; it is not about knowledge. Hence, [3].

19. [2] mentions that any nourishment must come down from the ocean's surface to the plains below. [3] gives the minuscule amount of organic matter that reaches the plains known as Challenger Deep. [1] questions the chances of organic matter going deeper still. [4] is positive in tone, whereas the rest of the sentences are negative, so though it is on the same topic, it does not fit with the rest. Hence, [4].

20. [4] and [3] are connected as [4] talks about the significance of minimum pay in mature democracies while [3] gives its significance in the developing world. [1] connects to [3] by supporting [3]. [2] talks about a division in opinion (regarding the implications of a minimum-wage floor in the developed world) which is not visible in [4]. Hence, [2].

21. A careful reading of the paragraph will show that it is about the tomb of Qin Shi Huang, the first emperor of China. [3] introduces the topic; [4] mentions a historian's description of the tomb, and [1] continues this description. Only [2] does not fit into the sequence, as it links only to [3], but not to the other two sentences. Hence, [2].

22. 1 states how the best way to communicate and share resources is to create a website. Statement D continues from the 1st statement to explain how setting up a website can be a difficult endeavour. This should be followed by statement B since it explains what things need to be done to set up a website. There is a clear BC link as well as 'all this' in statement C refers to the various poits mentions in statement B. Statement 6 follows logically from statement A, as statement A introduces the topic of a free web space provider, and 6 elaborates on it. Therefore, the correct sequence is DBCA.

23. 1 talks about the discovery of the biologists at the University of California and statement B describes the experimental study. 'The achievement' in statement A refers to the discovery mentioned in statement B. thus there is a B link. Statement D follows next with 'this issue' referring to 'the absence of a genetic mechanism...' in statement A, instead of statement C, as the question mentioned in statement C is a question asked by the creationists. Thus, the C6 link is clearly established. Thus, the correct sequence is BADC.

24. Statement C elaborates on 1, so it begins the sequence. Statement D links to statement C by providing a contrast using the word 'but'. Since statement A describes how the Sunil Gavaskar

Legend of Cricket Bat is designed, it follows statement B. Thus the correct order is CDBA.

25. 'They' in statement B refers to the PETRO group, so we get the 1B link. 'It' in statement D refers to 'the petroleum industry' instatement A, so there's an AD link. 6 follows from statement C. Thus the correct sequence is BADC.

26. The BA link is quite clear - there is a chronological link ['a few minutes ago ...', 'now ...'] as well as the contrast in mood. The DC link is also clear as statement D states how unimpressed she was by the exterior of the building while statement C mentions the frescos of Giotto i.e the internal artwork of the building. 6 clearly follows statement C as the latter mentions how she was unable to bring out the correct response after seeing the frescos while 6 mentions that she didn't want to be enthusiastic about unimportant monuments. Thus the correct sequence is BADC.

27. The statistics in statement B link it to 1 which has contrasting statistics. The DA link is clear as statement D asks a questions while statement A mentions how French entrepreneurs are asking this question. Statement C follows next as it mentions Dover which is across the channel and where taxes are low as implied by the phrase 'fiscal paradise'. It also connects to 6 which gives the answer to the question asked in statement D. Thus the correct sequence is BDAC.

28. Statements A and D make a pair as both state the advice given by Lucena. The word 'also', at the beginning of statement D, makes it clear that the sequence should be AD. 'Each grand master' in statement E refers to Garry Kasparov and Vladimir Kramnik, the two best players in the world, mentioned in statement C. Therefore, the CE sequence. However, statement B describes how jockeying is a time-honoured tradition while A states a specific example of the same. Therefore, the link BA seems natural. Thus, the correct sequence is BADCE.

29. 'This score' in statement D refers to the 'new definition of superpower' mentioned in statement B. Therefore, the BD link. A logical sequence would be one where the paragraph starts by stating the earlier definition, then moves to pointing out flaws in the earlier definition and finally suggests a new definition. Statement C states the current definition and is, therefore, clearly the beginning of the paragraph. Statement E must follow statement C as it adds to the information given in the latter. Also, AB is a clear link as statement A states the flaws with the current definition while statement B gives the new definition's parameters. Thus, the correct sequence is CEABD.

30. Statement B should begin the passage as it introduces Mahatma Gandhi and is the only sentence that contains his name. Statement C must follow statement B as it elaborates on the latter. EAD belong together as statements A and D support statement E. Thus the correct sequence is BCEAD.

PRACTICE EXERCISE 3

1. Statement C should begin the paragraph as it introduces friendship and gives some past information about it. Statement E refutes statement C. Therefore, CE is a link. Statement B should follow as it explains the current situation. Statement D elaborates the fact mentioned in statement B by giving examples. So it should come next. Statement A rounds off the paragraph by saying that the trend is catching on quickly. Thus the correct order is CEBDA.

2. Statement D states that rulers since the Pharaohs have regularly cajoled and threatened upstream nations. This introduces the topic and should come first. Statements A, B and E give examples of the measures taken by Egypt to prevent tampering with Nile's water. They should ideally be in the chronological order. Therefore, the sequence should be ABE. Statement C must follow statement B [and cannot be placed after E] because statement C talks about the same pact or treaty introduced in statement B. Thus, the correct sequence is DABCE.

3. The paragraph should start with statement B as it introduces the subject Betty Ford and her illness [on which the entire paragraph is based]. The extent of the illness is given in statement A, therefore, it should come next. Between statement E and statement D, the latter does not appropriately link to statement A as it implies that cancer is an occupational disease of America's political life, which doesn't make sense. Having discussed the physical ordeals of Betty Ford, the author introduces a contrast and discusses the psychological ordeals faced by her. This contrast is shown by the use of the word 'but'. Therefore,

statement E should follow statement A. The extent of psychological ordeal is discussed in statement C. Therefore, statement C follows statement E. Statement D talks more about the psychological ordeal and links itself to statement C, and is an appropriate conclusion to the paragraph. Hence, the correct sequence is BAECD.

4. ECD is a link. Statement C follows statement E because the former talks about the lack of electricity mentioned in statement E. Statement D comes next because it sums up the situation. Statement B should come before ECD [and not after] as the ECD link constitutes an example of how Indian voters have raised their expectations. So, statement B is a more appropriate starting line than an ending line. Statement A should come after ECD as it explains how 'he knew exactly what he was missing'. Thus, the correct sequence is BECDA.

5. The paragraph is about lack of access to morphine in some countries. So the paragraph must start with statement C, which introduces Dr. Eric Krakauer and the problem. Statement A talks about the actual problem: misinformation about morphine. Therefore, statement A comes next. Statement D explains the extent of the misinformation, so it must come after statement A. Statement B gives information that contrasts with statement D and also clears the misconception; therefore, it follows statement D. Statement E explains how the discussion has diverted the attention of people from seeing the possible benefits of morphine. Therefore, it is the last sentence. Thus the correct sequence is CADBE.

6. One clear link is FC, as statement C directly contradicts statement F. Another clear link is DA: statement A contradicts statement D. Statements E and B [in that order] explain the talent of the molecule and thus, must follow statement A. Thus the correct sequence is FCDAEB.

7. The paragraph talks about the problems associated with health care and possible solutions. Statement D comes first as it initiates the discussion about the problem. Statement D states that the solutions 'need not be complex' and statement C states that the simplest and perhaps the least obvious health programmes have proved effective in many countries; thus the DC link. Then the examples are discussed. Statement A comes next as it is the first example, which can be seen from the phrase 'for example'. Then, statement B follows. So, the correct sequence is DCAB.

8. The first sentence has to be statement C as it introduces the subject - the response. We see that statement D has to follow statement A. Since statement B mentions how the entries were touching tales and how it destroys a myth, it should be the concluding sentence of the paragraph. Thus the correct sequence is CADB.

9. With statement D which introduces the subject - 'Reserve Bank' - being the first statement, statement B as the second falls into place. Since statement C mentions what modification was made in its monetary policy, it follows next. Statement A is the last sentence as it states what was changed by the RBI. Thus the correct sequence is DBCA.

10. Only statement C can start the paragraph as it states the names of the state airlines along with the new airlines. This should be followed by statement A as 'most and many' mentioned in it refer to these new airlines. Statement D further elaborates why their ride has been bumpy while statement B provides the contradiction by stating that fliers have benefitted from this fierce competition. Thus the correct sequence is CADB.

11. Statement A has to follow statement C, since it is a reaction to statement C. This should be followed by statement D as it answers the question put forth in statement A. There is a clear DB link as statement D talks about going in the past and statement B gives an example of how grown-ups looked down on crying. Thus the correct sequence is CADB.

12. The one sentence that introduces you to the passage – i.e., the logical first sentence of the passage - is statement C. This can be followed by statement A as it mentions how even sapphire hawkers try to prove the genuineness of their sapphires. This should be followed by statement D as it mentions the gem shops in big hotels which contradict the small-time hawkers in statement A. Statement B is the last sentence of the paragraph as it states the success story of Thai precious rocks. Thus the correct sequence is CADB.

13. Statement D is the first statement as it mentions racing's biggest weekend. This should be followed by statement A as it mentions the race – Classic ITC Cup. Since statement A mentions the prize money, it should be followed by statement B

which states how the horses taking part in this race are some of the best. ('Also' is another clue which suggests that statement B should follow statement A). Statement C is the last sentence as talks about riding the best horses which are already mentioned in statement B. Thus the correct sequence is DABC.

14. This paragraph, comprising conversational statements, is unusual but one can follow the same method. Statement D is the first sentence as it mentions how one can see but cannot be felt. There is a clear DA link as statement A is a question asked about the creature mentioned in statement D. Logically, one sees that statement B follows statement A, as it is the answer to the question asked in A. Statement C is the last sentence since it states that the speaker is a cloud which is implied by the phrase 'for such a one am I'. Thus the correct sequence is DABC.

15. There is a clear DB link as statement D mentions an inscription while statement B mentions in whose memory this inscription is written. Statement C has to follow statement A, as it supplies the translation that is said to be missing in A. Thus the correct sequence is DBAC.

16. It is difficult to find a starting or an ending point in this sequence, therefore let us try and look for links. There is a BD link as statement B mentions 'they look like perfect pets' while statement D specifies what 'they' means i.e. lizards and pet reptiles. The other link is DC, 'salmonella' being the common factor between the two sentences. This should be followed by statement A as it mentions how people can get infected by these bacteria. Thus the correct sequence is BDCA.

17. Statement B follows immediately after statement D, as it explains how the all-important space (mentioned in statement D) can be utilized to maximize profits. This should be followed by statement C as it gives the example of grocery stores and how they utilize space. There is a CE link as well since statement C mentions 'grocery stores' and 'they' in statement E refers to these same stores. Statement A is best suited as a concluding sentence, as it mentions that other types of retail stores have begun to adapt grocery store ideas (mentioned in the previous three sentences). Thus the correct sequence DBCEA.

18. One is likely to come across a signboard only on reaching the village. So the CB link. On first impression, the sign board gives a warning. Thus statement E follows from statement C. When one is surprised about something, one will try to 'make sure', so statement D should follow statement E. Once you stop and read, you see what is actually written. Thus the correct sequence is CBEDA.

19. Clearly statement A or B cannot start the sequence. In fact, statement B provides the link to statement E with the contrast between what is 'easy enough' in statement E and the 'hardest part' in statement B. Hence we have EB followed by the question in statement A and its answer in statement D. Thus the correct sequence is EBADC.

20. The most obvious link EC as statement E mentions 'horizons' and statement C elaborates upon it with the phrase 'these horizons'. Again, there is a crucial link in AD. 'Marginal product of capital' in statement A is explained in statement D, and statement B closes the sequence. Thus the correct sequence is ECADB.

21. Statement C the first sentence of the paragraph because the whole discussion centres round the interaction of the teams. This should be followed by statement E which mentions that potential teams fail to spend time together. There is a clear AD link as the idea stated in statement A is carried forward in statement D. Statement B states a contradiction to the AD link and thus follows them. Thus the correct sequence is CEADB.

22. Statement C begins the sequence as it introduces the subject of 'mind'. This is elaborated in statement A by the reference to 'ancient times'. Statement E follows statement A by explaining this concept of ancient times by using the word 'then'. Statement D follows statement E as it explains how the difference between soul and spirit fluctuated over time. Statement B is the concluding sentence of the paragraph as it mentions how the metaphor of the breath of life expressed these ideas. Thus the correct sequence is CAEDB.

23. The main point of discussion is in statement B. Thus, it should start the sequence. 'Recommended introduction' in statement B takes us to statement D ('but before we introduce exchange traded interest rates'). Thus, the BD link. 'Understanding ground realities' in statement D is naturally to know 'the basic issue'(mentioned in statement

E). The final sequence should be CA as statement C mentions what a regulatory regime should not do and statement A states how it should ideally function. Thus the correct sequence is BDECA.

24. The BD link is fairly clear: statement B mentions that Wal-Mart has had to support its merchandizing performance, and statement D shows how it has done so. The AC link is another obvious one: statement A talks about a business strategy and statement C mentions the case of Wal-Mart as an example. Statement E talks about small town customers traditionally being the focus of Wal-Mart while statement B mentions how Wal-Mart has come closer to urban customers in the search of growth. So the EB link is also clear. Thus the correct sequence is ACEBD.

25. Statement E is the first sentence of the paragraph as it mentions the name of the film which is the topic of the paragraph. This should be followed by statement C because of the phrase 'this Academy Award-winning film'. Statement D starts narrating the plot of the film as follows the EC link. The last two sentences should be BA, as statement B states that the characters engage in practical jokes, and statement A gives examples of some such jokes. Thus the correct sequence is ECDBA.

26. Only statement B is possible as an opening sentence. Logically, it should be followed by statement E as 'medicine' is mentioned first, followed by statement D ('Psychology') and statement C ('Criminology'). Thus the correct sequence is BEDCA.

27. Statement D is the opening statement, as it is the only stand-alone statement that introduces the topic of 'radical feminism'. The DC link is prominent, as 'this form' in statement C refers to 'radical feminism' mentioned in statement D. Statement A presents a contrast to the idea in statement C, which states that radical feminism is not popular today. The EB link carries forward the idea in statement A that feminism is not only about radical feminism. Statement E states that oppression cannot be generic and statement B gives an example of that. Thus the correct sequence is DCAEB.

28. 'Taste' with its historic significance in statement B should start the sequence. 'It' in statement F refers to 'taste' and the aesthetic experience spoken of in statement B. So, we get the BF link. The 'two distinguishable elements' mentioned in statement F are elaborated upon in statement C. The other link is CD, 'discipline' being the common factor between the two sentences. EA is a better link as statement E compares taste to character in the aesthetic and moral life respectively followed by statement A which states a new topic about the universal standard of taste. Thus the correct sequence is BFCDEA.

29. The only stand-alone statement is A, as it introduces the subject of discussion. The 'record' in statement A is further elaborated in statement E. The next statement is B. Statements D, C and F give the logical sequence of the chain of reactions that followed the assault on Mr. Prescott. Thus the correct sequence is AEBDCF.

30. Statement E is the first sentence of the paragraph as it mentions temperance as the virtue of moderation and self-control in anything. 'But especially in pleasures' in statement C links it to statement E. The next link is AB, since statement A mentions Greek virtue while statement B mentions Plato's (a Greek) views on the same. The other link here is the BD link. Statement B talks about Plato's ideas, which are elaborated in statement D. Statement F follows statement D, as the difference between 'higher and lower parts' is further elaborated in statement F. Thus, the BDF link becomes vital. Thus the correct sequence is ECABDF.

PRACTICE EXERCISE 4

1. Statement B is the opening sentence as it introduces the idea of the systematic methodology of mass killings in the Holocaust. The AD link is very strong, as statement A talks about 'detailed lists' and statement D talks about 'meticulous records'. Statement E follows next, as it continues the idea of the methodology mentioned in the preceding statements. Statement C is the last sentence, as the phrase 'in addition' points out. It brings in a new topic - new methods of killing. Thus the correct sequence is BADEC.

2. Since the entire paragraph is based on radiation and colour, statement C is the first sentence of the paragraph as it mentions electromagnetic radiation to be a mixture of different wavelengths and intensities. There is an EBD link as statement E mentions which radiation is called light while

the phrase 'the light's spectrum' in statement B links it to statement E and 'the full spectrum' in statement D links it to statement B. Since statement A talks about many more spectra, besides colour sensations, it should conclude the paragraph. Thus the correct sequence is CEBDA.

3. Statement B seems like a much better opening sentence than statement A, as it is more general in nature. There is a clear EA link as statement E mentions how tango was not performed in this way earlier and how new forms of the dance continue to develop while statement A states how tango was performed in its formative days. 'And' in statement C implies that women didn't always give up control within the dance and was another problem faced by tango dancers. Statement D follows statement C, as it gives an example of how women started taking control in tango. Thus the correct sequence is BEACD.

4. Statement B has to be the first sentence, as it is the only one that mentions the person being discussed by name (i.e. Matthew), whereas all the other statements use only pronouns. Since statement A describes how Matthew was a quiet person and preferred talkative people as long as they didn't expect him to talk. The 'but' in statement E is a contrast to his intrinsic nature and follows statement A. The other link is ED, 'girl' being the common factor between the two sentences. Statement C gives the reason as to why Matthew thought little girls to be worse than women. Thus the correct sequence is BAEDC.

5. The link which helps solve this question is the EA one. Statement A elaborates on the information given in statement E. 'The process' mentioned in statement C is stated in statement A and thus the AC link is formed. 'These' in statement D refers to the 'poorly embalmed bodies' in statement B. so there is a BD link as well. Thus the correct sequence is EACBD.

6. There is a strong link between statements C and E, as the latter qualifies the expression 'apparent lack of purpose or cause' in the former. Since statement A talks about cause/effect, it comes after CE. There is another link between B and D - the former mentions animals and the latter goes on to give an example about animals. Thus the correct sequence is CEABD.

7. Statement E must be the beginning of the paragraph or the end as it fits in as an introductory line as well as the conclusion of the passage. BA is a pair because both mention two programs introduced for helping out borrowers. Statement C describes the failure of these programs. Therefore, it should come after BA. The phrase 'in fact' shows clearly that statement D should come right after C. Thus the correct sequence is EBACD.

8. EC is a strong link as statement C talks about the 'offer' that is mentioned in statement E. Also, statement E is the most appropriate statement to start, as it states an incident which is the trigger for the actions described in the entire paragraph. The reply of the Maoist leader can be received only after the offer has been made to him. Therefore, statement B should follow statement C. Statement D adds to the rejection of the offer by stating that the Maoists refused to give up arms too. Therefore, statement D comes after statement B. The reaction of the state police to the rejection of the offer logically comes last. Thus the correct sequence is ECBDA.

9. The passage is about the diplomatic dialogue between the United States and India. Statement E marks the start of the topic, as it is the only standalone sentence. Statement D goes on to explain why the recently concluded dialogue is just another talking shop. Therefore, D should come next. Now looking at the remaining statements, B introduces an idea which is opposite to the idea discussed in the first two statements. Thus the use of the word 'but' in statement B links it strongly to statement D. BA is another link as the 'first' indicates that A is the first key shift of the 'two key shifts' mentioned in statement B. Statement C mentions the second of the two key shifts and it should come next. Thus the correct order is EDBAC.

10. Statement B must begin the paragraph as it mentions India's track record of producing great writers but not buying books. In statement E 'that lack of enthusiasm' refers to statement B, which mentions that there are not enough buyers of books of Indian authors. So there is a BE link. This should be followed by statement C as it mentions how only one foreign publishing house was located in India. Statement D is a contradiction to the views presented as it mentions how the brightening of the economic outlook in the country

is helping aspiring authors and publishers. DA is a mandatory pair because statement A provides the proof of the argument in statement D. Thus the correct sequence is BECDA.

11. The passage sequence cannot start with A, B, or C because of 'but', 'they' and 'furthermore' respectively. Because of the clearly stated DA link, statement E cannot be the opening sentence. Thus D starts the sequence, followed by A. Statement E mentions how copyright regulations were announced last year. 'They state' in statement B refers to the regulations mentioned in statement E. Statement C follows the EB link as it mentions some other regulations to the replicated or copied versions as pointed out in statement B with the phrase 'similar works of art'. Thus the correct sequence is DAEBC.

12. Statement E follows statement B (which begins the sequence by introducing a link between Canada and Bollywood) because statement E elaborates on the comment made in statement B. Statement D follows statement E as the 'projection' in statement D refers to the figure in statement E. AC is another prominent link as A.S.Rattan in statement A is referred to as 'him' in statement C. Thus the correct sequence is BEDAC.

13. Statement B is the first sentence of the paragraph as it mentions the topic of the paragraph i.e. channel conflict. This should be followed by statement E as it mentions how channel management can help to understand a conflict's source and gravity. Since statement C elaborates on the destructive kind of conflicts, it follows the BE link. There is a DA link as well since statement D mentions the reaction of 'the best manufacturers' and statement A that of the 'less sophisticated players'. Thus the correct sequence is BECDA.

14. Statement A is the opening sentence because it opens the topic of the lyre bird's behaviour. On close observation, the AD link is clear as 'reports' in statement D is in direct relation to the observations made by the ornithologists in A. Statement B flows from statement D, as that there is no 'mistaken identity' issue is further confirmed in statement B. The other link is BE, 'the bower and the lyre' being the common factor between the two sentences. The CF link is also clear as statement C mentions the sweet things whispered to the female and statement E giving an example of the sweet things whispered. Thus the correct sequence is ADBECF.

15. [1] introduces the topic of impressionist paintings and how they were different. [4] should follow [1] as it talks about another point of difference. [3] and [4] are connected as [4] talks about the change in the treatment of colour and outline while [3] states the change. However, [2] talks about impressionist painters (not paintings) and their lack of interest in philosophy. Hence, [2].

16. [4] mentions Clark's theoretical arguments. [2] introduces the theoretical argument. [1] continues that line of thought. However, [3] talks about an alternative to constructivism. Hence, [3].

17. [2] should start the paragraph as it introduces how reading comprehension takes place. [4] and [1] are connected by the 'word recognition' link. [4] gives a condition for proficient reading and [1] talks about what happens if that condition is not met. [3] talks about analysing text without reading it. It does not follow the same line of thought as the other sentences. Hence, [3].

18. [2] mentions the effects of caffeine and attributes them to the inhibition of the production of phosphodiesterase. 'Cyclic AMP' connects [1] and [2]. Both [1] and [3] explain how the effects of caffeine come about. [4] weakens the argument put forth by [2]-[1]-[3]. Hence, [4].

19. [4] gives the meaning of war as per the Oxford Dictionary. 'This' in [2] refers to the definition in [4]. [2] praises the definition and then [1] goes on to question an aspect of it [3] talks about the 'philosophy' of war and not its definition. Hence, [3].

20. [1] and [4] are clearly related to each other due to the phrases 'on one hand' and 'on the other'. Since these sentences talk about disease and evolution, [2], which talks about the problems of climate change and antimicrobial resistance should precede them. Though [3] also talks about protecting the planet, it doesn't fit with the other three sentences at all. Hence, [3].

21. [2] is the opening sentence followed by [4] ('such naturalness' refers to Merkel's actions in [2]) and [1]. [3] only connects with [2] but none of the other sentences. Hence, [3].

22. [2] is the only possible opening sentence. [1] and [3] are connected as the hints about job cuts would have led to speculation. [4] doesn't connect as well to [1] as [3] does because [1] talks about a past event while [4] talks about future possibilities. Hence, [4].

23. [2]-[1]-[4] make a better connected paragraph than any other combination. [2] talks about how lyrics are important to music, [1] gives the example of the singer and [4] mentions what comes out of his mouth i.e., the lyrics. Hence, [3].

24. [4] is the opening sentence as it talks about the two kinds of emotions related to music. This is followed by [1] as it elaborates on 'perceived' and 'felt' emotions. [3] follows [1] as it further differentiates between the two kinds of emotions. [2], which talks about noise levels and processing difficulty, does not connect to any sentence. Hence, [2].

PRACTICE EXERCISE 5

1. The paragraph starts with [2] which explains that when *Music and the Brain* was published 20 years ago, neuroscience was not advanced enough to explain the phenomena mentioned in [2]. This is followed by [4] as it explains how the last 20 years have seen advances in this field. [4] also asks why music has so much power over us. [3] mentions how relevant that question is. Thus, the correct sequence is [2]-[4]-[3]. Though [1] also talks about music, it does not contextually fit with any of the other sentences. Hence, [1].

2. [2] is the opening sentence as it talks about how therapists help clients identify the problematic beliefs. [4] follows [2] as it reveals what this stage is called and how it helps the patients. [3] further elaborates on functional analysis. [1] talks about negative thinking patterns, which are not mentioned in any of the other sentences. Hence, [1].

3. [4] puts forward a conditional argument. [1] and [3] support it with results. [2] talks about the 'hardness' of scientific research and is not related to any other sentence. Hence, [2].

4. [2] states that humans have certain common needs and values. Based on this statement, [1] states that it is possible to develop a scientific system of ethics in the future. [3] follows [1] as it states what will continue to happen till such a system is developed. [4] also talks about motivations and values but attributes these to biology and early experiences. These two factors are different from what the remaining sentences discuss: needs, drives, interests, etc. Hence, [4].

5. [4] is the opening sentence of the paragraph as it introduces the most important feature of the two commentaries mentioned. [2] follows [4] as it elaborates on how explanations have been written in these commentaries. This is followed by [3] which further expounds on the rules explained in the commentaries. It can be deduced that [2] and [3] are elaborating on [4], not [1], because of the 'rule and procedure' link. Hence, [1].

6. [2] introduces the author's perception about human rights not providing a fully comprehensive account of morality. [1] exemplifies [2]. [4] talks about what human rights do instead. [3] talks about human rights being one of many moral perspectives, which is a tangential point. Hence, [3].

7. [3] starts the paragraph as it talks about the campaign of the restaurant workers. [2] is a response to this campaign while [4] gives a reason for the response. Though [1] also talks about food stamps, it talks about 'poor Americans' in general while the rest of the sentences are specific to restaurant workers. Hence, [1].

8. [3] introduces the crucial element of sympathy. [1] and [2] follow; they are connected as they talk about beneficial and harmful experiences and their effects on sympathetic people. [4] is in slight contrast to the remaining sentences as 'sympathy' requires us to understand what another person is experiencing. Hence, [4].

9. [3] mentions the tendency of Indian scholars to exaggerate the achievements of a particular mathematician, ignoring his contemporaries. [1] reveals the result of this tendency. This is followed by [2] as it talks about the tendency of Western historians to ignore the mathematical achievements of India. 'Again, even more unfortunately' connects [2] to [3] and [1]. The tone of [4] contrasts with the tone of the rest of the sentences as [4] undermines India's contribution to mathematics. Hence, [4].

10. [1] is the opening sentence as it asks the question about being altruistic. This is followed by [4] as it explains why biological altruism does not answer the question. 'This' in [3] refers to the information given about biological altruism in [4]. [2] gives a different perspective on evolutionary theories by stating their usefulness while the intention of the rest of the sentences is to reveal their lack of usefulness. Also, [2] seems redundant as [4] gives the same information. Hence, [2].

11. Statement B defines the ancient form of Origami. The conjunction 'but' in statement D is significant as it states how Origami is assuming a new role these days. So one gets the BD link. Statement A should precede statement C, as Martin Kruskal is introduced in statement A. Thus the correct sequence is BDAC.

12. Note the AB link. 'Since then' in statement B follows the time 'when the oil crisis hit the world'. But 'at that time' in statement D refers to the time before the oil crisis hit the world. So statement D must follow 1. The C6 link is prominent, as statement C gives an example of the kind of cars being created by Chevrolet and 6 talks about the possibility of launching this car in the Indian market. Thus, the correct sequence is DABC.

13. 'Those rates' in statement D refers to the rate mentioned in statement A, so statement D has to follow statement A. Statement A seems to make more sense if it follows directly from statement C. Since statement B mentions another crises, it is the concluding sentence of the paragraph. Thus the correct sequence is CADB.

14. The passage discusses the types of environmental standards. This is introduced in statement A with reference to the U.S. The three types of environmental standards follow in the order in which they are mentioned, so statements C, E and B follow. However, we find that statement D qualifies what statement E has to say, so the order is C-E-D-B. Statement F is an example of what is stated in statement B, so it follows statement B. Thus the correct sequence is ACEDBF.

15. The passage should start with C because it is the only stand-alone sentence. Statements E and B follow statement C, as they both explain how Indonesia and Vietnam respectively 'come out differently', as mentioned in statement C. 'Such are the two vagaries' in statement D refers to the examples in statements E and B, and so follows them. Statement A concludes the sequence. Thus the correct sequence is CEBDA.

16. The paragraph must start with either statement B or E, as all the other statements refer to O'Brien as 'he'. Statement B is a better opening statement, as it states O'Brien's origins. Then comes statement D which talks about his job. The word 'later' shows that statement A goes on to elaborate on his work. 'Towards the end of his career' marks the end of the paragraph. Therefore, statement C is the last sentence. Thus the correct sequence is BDAEC.

17. Statement C is the opening sentence as it introduces the topic of how cures for certain diseases are being found. The CB link is established, as 'these diseases' in statement B refers to the set of diseases mentioned in statement C and not the set mentioned in statement A. Also, there is no logical link between statement C and any of the other sentences. Thus it is the opening sentence of the paragraph. The BD link can be established, as statement D makes a comparison with the information given in statement B. Statement A lists the diseases that statement D talks about. Thus the correct sequence is CBDA.

18. Statement A is the opening sentence of the paragraph as it mentions how over the years, Florida's real estate values have become beyond the reach of many families. Statement D can only relate to statement A since it mentions how long the dysfunctional property-tax system has been haunting Florida. There is a BC link as statement B states how in the 1990s a homestead measure was introduced resulting in a cap on assessed property value while statement C mentions how base assessment values are different when houses are sold. Statement E is the concluding sentence as it mentions specifically to property levies in only Southern Florida while the rest of the sentences are for Florida in general. Thus the correct sequence is ADBCE.

19. After the first statement, there seem to be two possible options for the next sentence: statements A and B. However, if statement A is chosen, there is no way in which statement D could fit in later, as it is an argument which supports the 'race to bottom' view. Thus, the second sentence is statement D, and the third sentence is statement A. Statement C mentions what the companies would actually look to do, and statement B describes what effect this outlook may have on the economy. Hence, the correct sequence is DACB.