

FACE Prep READY RECKONER

FOR TCS NQT HIRING 2020-21

The TCS NQT, arguably the year's largest recruitment event, is slated to happen on Oct 24, 25 and 26, 2020. This Ready Reckoner PDF will detail the TCS NQT Registration, Eligibility Criteria, Test Pattern, Syllabus as well as Most Asked TCS NQT Questions from Previous Years.

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A. About the TCS NQT

The TCS NQT (National Qualifier Test) is a test that's used as a gateway to jobs across various sectors and organizations, the most important one being TCS. Until last year, this test was exclusively open only for final year students and for recruiting only for TCS. This year, however, there are some exciting changes and the scope of the NQT has expanded.

The TCS NQT is a nation-level employability test conducted by TCS iON (an assessment company, also an official subsidiary of TCS). Taking on the test provides you with a score that's valid for 2 years. It helps you apply for entry-level roles in corporate industries such as IT, FMCG, Manufacturing, BFSI, Pharma etc. Companies such as TCS, Croma, Titan, Godrej and more TATA Group and non-TATA Group companies are affiliated with TCS iON in recognizing the NQT score as a pathway for hiring candidates. The NQT score is also a gateway for 2021 pass-outs to apply for the TCS Campus Hiring Programme.

B. Important Dates

Registration End Date 17 Oct 2020
National Qualifier Test Date 24/25/26 Oct 2020

C. Broader Eligibility for the TCS NQT

- UG, PG and Diploma students in their pre-final and final year of study
- Students with any degree and specialisation/discipline
- Freshers with less than 2 years of experience
- Age limit - minimum 18 years and maximum 28 years

This NQT can be taken any number of times and the score provides a gateway to jobs across various sectors.

Note:

Please note that NQT is a test which can be taken as per the above eligibility. TCS will be using the NQT to conduct Campus Hiring for the 2021 Batch. There is a separate eligibility for the latter. (see next page)

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D. TCS Campus Hiring YOP 2021 and Eligibility Criteria

TCS is also conducting its flagship Campus Hiring initiative of 2021 pass-outs across the country through the NQT. The primary role that TCS hires for through this Hiring Programme is nicknamed TCS Ninja. Top-performers in the NQT may also be provided an opportunity to apply for TCS Digital (the 7 LPA offer provided by TCS).

To participate in the TCS Campus Hiring of 2021 pass-outs, one must write the NQT and get a score. Here's the eligibility criteria for the TCS Campus Hiring YOP 2021.

DEGREES AND BRANCHES

BE/B.Tech/ME/M.Tech/M.Sc/MCA 2021 pass-outs from any stream

PERCENTAGE

An applicant must have minimum 60% or 6 CGPA throughout academics and an aggregate of 60% or 6.00 CGPA in the highest qualification till the semester for which results have been declared.

BACKLOGS / ARREARS / ATKT

The applicant must not have more than 1 active backlog/arrear/ATKT while appearing for the TCS Selection process.

If selected, the student while joining TCS must have cleared all pending backlogs/arrears/ATKT within the course duration as stipulated by the University failing which joining will not be permitted.

GAP / BREAK IN EDUCATION

It is mandatory to declare academic gaps. Overall break should not exceed 24 months. Any exceptions are permissible only for valid reasons subject to satisfactory check of relevant document(s) at the time of test/interview/onboarding

AGE

An applicant should be between 18 to 28 years of age to participate in the TCS Campus Hiring process.

COURSE TYPES

Only full-time courses will be considered (part-time / correspondence courses will not be considered).

Applicants with Secondary and / or Senior Secondary course from NIOS (National Institute of Open Schooling) are eligible to apply, if the other courses are full time.

EXTENDED EDUCATION

Applicants with extended education in the highest qualification are not eligible. Any exceptions are permissible only for valid reasons subject to satisfactory check of relevant document(s) at the time of test/interview/onboarding.

E. Registration for TCS NQT and TCS Campus Hiring YOP 2021

TCS Campus Hiring for 2021 Pass-Outs

Step 1: Register yourself for the entrance/apptitude test on the National Qualifier Test (NQT) website.

Registration link: <https://learning.tcsionhub.in/hub/national-qualifier-test/>

Select "Subject Test" option in the NQT registration form which includes "Programming Test" to ensure your candidature is considered for TCS Campus Hiring YoP 2021.

Step 2: Navigate to TCS Next Step Portal

Registration link: <https://nextstep.tcs.com>

'Apply for Drive' post completion of your application process.

TCS NQT for other batches (2020, 2019, etc)

For other batches, TCS NQT is a gateway for jobs in companies associated with TCS iON.

Register yourself for the National Qualifier Test (NQT).

Registration link: <https://learning.tcsionhub.in/hub/national-qualifier-test/>

If you're aspiring for jobs in IT companies, please choose "Subject Test" option, which will test your Programming Concepts and Coding Skills.

TCS NQT vs. TCS Campus Hiring - Easily Explained

TCS NQT for TCS Campus Hiring 2021 YOP



2021 pass-outs from BE/ B Tech/ ME/ M Tech/ M Sc / MCA (any stream)



Hiring for the flagship TCS Ninja role. Toppers may get opportunities for TCS Digital.



2-step registration:

- Register for the NQT on the TCS iON website
- Apply for Drive on TCS Campus Commune



Must take up the Subject NQT (Programming Logic and Coding) along with Verbal, Reasoning to be eligible

TCS NQT for jobs in companies associated with TCS iON

- 2021 & 2022 pass-outs from UG/ PG/ Diploma (any discipline and stream)
- Freshers with < 2 years of experience

Jobs possible across IT (including TCS), BFSI, Manufacturing, Pharma, FMCG etc sectors through companies affiliated with TCS iON

Register for the NQT on the TCS iON website

Subject NQT optional depending on whether you target IT jobs

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F. Test Pattern

The pattern of the NQT has gone through a change this year. Here is the updated pattern.

Section	# Qs	Duration (minutes)	What's changed from last year?
Verbal Ability	24	30	For the first time, the NQT will have a longer Verbal Ability section (until previous year, it was a 10-minute section)
Reasoning Ability	30	50	Brand new section for the NQT
Numerical Ability	26	40	Rebranded from what was earlier called Quantitative Aptitude. Change in no. of Qs and duration.
Programming Logic *	10	15	Reduced duration (until last year, this was a 10 Qs, 20 min section)
Coding *	2	45 (1Q for 15 mins and 1Q for 30 mins)	Increase in no. of Qs and duration (Last year, it was 1Q in 30 minutes)

* The Programming Logic and Coding sections are applicable only for candidates who choose the Subject NQT while registering for the NQT. The Subject NQT is mandatory to take part in the TCS Campus Hiring of 2021 pass-outs.

G. Detailed Syllabus

Here's the syllabus for the updated pattern of the NQT.

Verbal Ability

Until 2019, this section majorly had questions on Cloze Passage. With a expansive section this time, here are the topics that you must prepare yourself on.

- Reading Comprehension
- Sentence Correction or Error-Spotting (Covering topics such as Subject Verb Agreement, Pronoun Agreement, Parallelism, Prepositions, Articles, Tenses, Modifiers etc.)
- Sentence Completion
- Para-Jumbles
- Cloze Passage
- Vocabulary
- Phrasal Verbs and Idioms
- Voices and Forms of Speech

Reasoning Ability

This is a brand-new section for the NQT. Here are the topics that you must focus on.

- Data Arrangements (Linear, Circular and Multi-dimensional)
- Coding, Decoding, Series and Visual Reasoning

- Blood Relations
- Data Interpretation
- Data Sufficiency
- Clocks, Calendars
- Cubes and Direction Sense
- Logical Connectives and Syllogisms
- Venn Diagrams
- Inequalities

Numerical Ability

This is one of the toughest sections in the NQT. Here are topics that have been tested in previous years.

- Permutation and Combination
- Number System
- Probability
- Time Speed and Distance
- Equations
- Geometry, Mensuration and Progressions
- Ratios and Proportions
- Functions, Logarithms and Graphs
- Clocks, Direction Sense
- Profit and Loss, Averages, Mixtures and Alligations
- Puzzles
- Physics
- Base Conversion

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Programming Logic

Last year, this section had questions from Fundamentals of Programming (Data Types, Operators, Looping and Conditional Statements, Arrays, Strings, Functions) in C, C++ and Java. 60% of MCQs in TCS last year were from C++.

There were also questions on:

- Object Oriented Programming (OOPS)
- Standard Template Libraries (STL)
- Object Modeling
- Compiler Design
- Threading
- Data Structures: Linked List, Stack, Queue, Trees and Graphs
- Recursion

For this year, do additionally prepare on:

- Pseudocoding
- Algorithms
- Basic Software Development Cycle

Coding

The Coding section will consist of 2 questions to be solved in 45 minutes. The questions are expected to be of easy to medium difficulty level.

The exact construct of this section will be:

- 1 Question for 15 minutes
- 1 Question for 30 minutes

The languages allowed will be C/ C++/ Java/ Python 2.7/ PERL.

You are expected to master Fundamentals of Programming in any 1 language of your choice to be able to crack this Coding Section.

H. Most Asked TCS NQT Questions from Previous Years

H1. Verbal Ability

Q1 to Q5: Fill in the blanks in the passage given below using the options provided.

India has the potential to become a cyber- security powerhouse. We must take advantage of the fact that India is entering the demographic dividend phase and provide adequate training opportunity for the youth. The_1 the future cyber security workforce and it is important to_2 cyber security courses from ground up in the curriculum of middle-school, high school and college students. Other countries notably Israel, have already taken steps to educate the youth on cyber threats and attacks and effective_3 against such threats. The National Skills Development Council (NSDC) has several qualification packs in Cyber Security that will create a skilled workforce. As a_4_, a course on Cyber Security covering areas like cryptography, network security and secure application development_5 in TCS for 500 fresh Science graduates.

Q1. Fill in the 1st blank.

- | | |
|----------------------|-----------------------|
| a. Youths constitute | b. Youth constitutes |
| c. Youth constitute | d. Youths constitutes |

Answer: Option B

Explanation:

This can be answered through knowledge of the following things.

- The plural form of youth is youths.
- The subject introduced in the sentence prior to the first blank is youth (singular, i.e. "...adequate training opportunity for the youth")
- As per Subject Verb Agreement, the appropriate verb for the singular subject youth is constitutes. Similar examples include bird flies, boy runs, the movie plays, etc.

Thus, the answer is option b.

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Q2. Fill in the 2nd blank.

- a. Embed b. Instill c. Attach d. Extend

Answer: Option a

Explanation:

If keywords to help answer this blank are ground up. If one were to proactively solve this blank, we'd go for a word that's similar to incorporate.

Amongst the answer options, Embed means incorporate something, while Instill means inculcate ideas of qualities (not something that's physically tangible, but more used with qualities, i.e. intangible stuff). The other answer options won't fit in anyway, and thus the right is between options A and B.

Since we're discussing incorporation of something physically tangible here (i.e. cyber security courses), the answer is option a.

Q3. Fill in the 3rd blank.

- a. Warfare b. Countermeasures
c. Softwares d. Viruses

Answer: Option b

Explanation:

The key phrase is against such threats. Countermeasures are what you take against threats. Thus, the answer is option b.

Q4. Fill in the 4th blank.

- a. Stopgap arrangement b. Piece of the puzzle
c. Fight in this stair d. Step in this direction

Answer: Option d

Explanation:

The sentence prior to the blank talks about the NSDC having several qualification packs on Cyber Security. It is in continuation to it that TCS has a course on Cyber Security. Thus, the right answer is option d.

Stopgap arrangement: Temporary arrangement

Piece of the puzzle: An element that helps you solve a mystery

Q5. Fill in the 5th blank.

- a. Is in the cockpit b. Is piloting
c. Is being piloted d. Are being piloted

Answer: Option C

Explanation:

Cockpit refers to an aircraft term, unlike piloting (which can also mean testing/ trying for the first time). Thus, option A is eliminated. The sentence here is in passive voice. Thus, one cannot use option B (in which case, we need to know who is piloting this course). The sentence is not structured to work in the active voice form.

Between options C and D, option C is the right answer since the subject (a course on Cyber Security) is singular. We need a singular verb (is being piloted).

Qs 6 to 10: Fill in the blanks in the passage given below using the options provided.

TCS business leader, Ashok Pal, recently blogged: "Too much focus on technology and too little on the operating model will, after initial success, _6 the enterprise in the middle of a digital dip. Such a digital dip is typically caused by _7 approach, confusion over KPIs, conflicting _8 views, and poor user adoption. Operating model changes without adequate technology upgrade will _9 the efficiency of the enterprise.

Remember that digital success across the breadth and depth of the enterprise is the real objective. It is much easier to succeed with smaller projects. For lasting results, technology transformation must be driven by a comprehensive IT and operation _10 that leverages agility, analytics automation, and cloud."

Q6. Fill in the 6th blank.

- a. Landed b. Land c. Lands d. Left

Answer: Option b

Explanation:

Here, the subject is enterprise. The appropriate verb to with the future tense auxiliary verb (will) is land. While forming future tense, the syntax is always will + singular present tense form of the verb.

Q7. Fill in the 7th blank.

- a. Siloed b. Singleton c. Bottom-top d. Heroic

Answer: Option a

Explanation:

The key words that help you answer this question are "...too much

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focus on technology and too little focus on the operating model". This means there's focus only on one area, while the other is neglected. We need a word that symbolizes this meaning. That is done by siloed. It's meaning is isolated from others. In this case, it refers to approach where other options are neglected.

Q8. Fill in the 8th blank.

- a. Client b. Stakeholder c. Consumer d. Rival

Answer: Option b

Explanation:

This part of the paragraph talks about a dip in an organization. It cannot be caused by client or consumer or rival views, all of whom are external agents to an organization. However, stakeholder refers to internal decision makers and parties concerned, who can cause this digital dip. Thus, the answer is option b.

Q9. Fill in the 9th blank.

- a. Maximize b. Sophisticate c. Constrain d. Increase

Answer: Option c

Explanation:

We need an answer option that refers to something that will be done to the efficiency of the enterprise when operating model changes are without adequate technology upgrade. Technology upgrade is positive. Thus, without adequate technology upgrade, only something negative can happen to an enterprise's efficiency. The only negative answer option is option c. Constrain, by the way, refers to control or stunt.

Q10. Fill in the 10th blank.

- a. Protocol b. Pact c. Law d. Framework

Answer: Option d

Explanation:

Protocol: A set of rules and regulations

Pact: An agreement

Framework: A structure or system

In this sentence, the option that best fits is option d, since we're looking for a word that goes with operations. Operations protocol (or) operations pact (or) operations law do not fit well when talking about something that leverages agility, analytics automation etc.

Q11. One part of the sentence below may contain an error. Identify the part. If there is no error, choose 'No error'.

Suma told / she would answer / all the calls later.

- a. Suma told b. She would answer
c. All the calls later d. No error

Answer: Option A

Explanation:

Whenever told is used, it must always be followed by a person (told X, told Y, told Z etc.). In this case, that person (told whom?) is missing. Thus, option A is error-strewn.

Q12 to Q14: Please go through the following passage to answer the questions that follow.

In the game of cricket, any side with a pair of bowlers of complementing superior qualities prove invincible. The current generation would know the Bhuvnagar or Starc-Cummins pairs better than their own parents. So, let me dissect a pair that ruled the cricketing world during the fifties and early sixties. Brian Statham and Fred Trueman of England proved to be a lethal combination that every batsman wanted to avoid playing. Statham was a bowler of immaculate accuracy, nagging length and lyrical run-up. Oxymoronically, his virtues were the basis for his misfortunes. Knowing that he would bowl in a manner that's unplayable, batsmen were smugger in defending his balls than when playing an erratic bowler.

Trueman, nicknamed as Fiery, had a long delivery stride and made no bones about his intentions to test batsman's physical and mental strength. The ball would flash past the bat in moments of incredibility with the batsman thanking his Maker, if the ball missed his limbs and occasionally the stumps.

Q12. Which one of the following sentences has an appropriate bold part that can be replaced with lethal?

- a. The series of never-ending bubbles rejoiced the children to any end
b. The never-say-die team won the tournament for the tenth time.
c. Mount Vesuvius' eruption proved to be completely ruinous to Pompeii.
d. The life-saving drug administered to the patient brought him back to his elements.

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Answer: Option c

Explanation:

The meaning of lethal is dangerous. This can be contextually deciphered by going through the sentence "...a lethal combination that every batsman wanted to avoid playing" if you didn't know the meaning of the word.

The answer option that best uses this meaning is option C. Ruinous means disastrous, which is similar to what we need.

Q13. Any team with two bowlers sharing the required traits is:

- a. Arrogant to its opponents
- b. Vulnerable to choke
- c. Hard to defeat
- d. Insignificant in its contribution

Answer: Option c

Explanation:

This can be answered by going through the very first line of the passage ("In the game of cricket, any side with a pair of bowlers of complementing superior qualities prove invincible.")

Invincible: Hard to defeat

Q14. Oxymoron is a special language device, where

- a. A tough idea is simplified by bringing a simple parallel to it
- b. Two contrasting elements are placed side by side reinforcing an idea
- c. A brilliant object issued in place of a dull entrance
- d. An abstract entity is compared to an exactment emphasising similarity/difference

Answer: Option b

Explanation:

You could try answering this question through your knowledge of the word's meaning, which would point to option B. You could also try deciphering it by going through the line where this word is used in the passage ("Oxymoronically, his virtues were the basis for his misfortunes.") The line in the passage goes on to mention that a positive quality (virtue) was also negative (misfortune), thus rhyming with option b.

Here are more examples of oxymorons in the English language.

- Bittersweet
- Act naturally
- Deafening silence
- Definitely maybe

Q15. For the four-sentence (S1-S4) paragraph given below, sentences S1 and S4 are given. From the options P, Q and R, choose appropriate sentences for S2 and S3 respectively.

S1: Can we imagine carrying objects that are ten times heavier than our own body weight?

S2: _____

S3: _____

S4: This is because of their small body size; it enables them to use fewer muscles to carry their own body and more to carry bigger loads.

P: Ants, however are able to carry or pull objects much heavier than their own body weight.

Q: One would assume that they have stronger muscles that enable them to have more strength than humans.

R: Superman probably could, but it does not seem possible for an ordinary man to do so.

a. PR

b. RP

c. QR

d. RQ

Answer: Option b

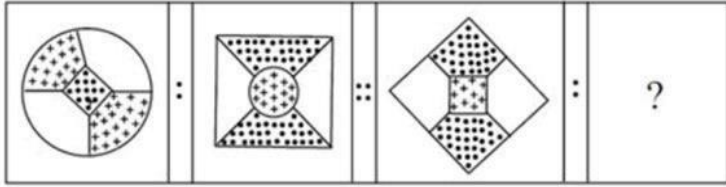
Explanation:

S4 begins with "This is because of their small body size". Thus, we need a sentence before S4 that introduces a subject which will have small body size. That is done by P (Ants is the subject). This means that P has to immediately precede S4.

The only answer option with P at the end is option b.

H2. Reasoning Ability

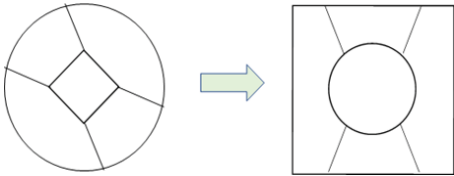
Q1. The two figures on the left of the sign “::” are related in a certain way. The same relationship holds good for the second pair of figures on the right of the sign “::” of which, one figure is missing. Find the missing figure from the alternatives.



Answer: Option C

Explanation:

Step 1: The shapes should be swapping their positions and the inner image should be tilted by 45° clockwise when it comes outside and the shaded portion should also be tilted by 45°



Step 2: Swapping the symbols inside the shapes



The only option which follows these conditions is option C

Q2. A medical representative plans to visit six doctors A, B, C, D, E and F - one doctor per day - during a week from Monday to Saturday.

- i. He visited D on the day just before the day he visited B
- ii. He visited C on Monday
- iii. He did not visit F on either Tuesday or Saturday
- iv. He visited A on the day before the day he visited E
- v. He visited D on some day after he visited A

Which doctor did he visit on Saturday?

- a. A
- b. B
- c. D
- d. E

Answer: Option b

Explanation:

- He visits B immediately after D (DB should be together)
- C visits on Monday(M)
- He can visit F on Wednesday(W) or Thursday(Th) or Friday(F)
- He visits E immediately after A(AE should be together)
- D should be after A(not immediately)

C AE F DB = M TW Th FS

He visited B on Saturday.

Q3. A statement is followed by two assumptions numbered I and II. Consider the statement and decide which of the given assumption(s) is/are implicit in the statement.

Statement:

In spite of several efforts by the environmentalists, some of the rarest species of birds are on the brink of extinction.

Assumptions:

I. People, in general, do not care for birds and engage in actions that threaten the survival of certain bird species.

II. Whether or not environmentalists care, every species would be extinct in course of time.

- a. Only I is implicit
- b. Only II is implicit
- c. Both I and II are implicit
- d. Neither I nor II is implicit

Answer: Option d

Explanation:

Meaning of the statement given: Environmentalists put efforts to safeguard the species = But some of the rarest species of birds are still in the brink of extinction.

Assumption I - As per the statement, we do not have any information about people, in general. So this is not implicit from the statement given.

Assumption II - The meaning of the statement given is about the rarest bird species becoming extinct but this assumption is about the entire species becoming extinct, which is not in line with the given statement. So, this assumption does not implicit the statement.

Neither I nor II implicate the statement.

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Q4. Three shops A, B and C sold cars in January, February and March. The total number of cars sold in this three-month period by A, B and C were 460, 320 and 500 respectively. Both A and C sold the same number of cars in January. The number of cars sold by A and C in March was also the same. A sold 120 cars in February which was half of the number of cars sold by C in March. Both A and B sold exactly the same number of cars in February. The ratio of the number of cars sold by B in January and March was 1:4

What was the ratio of the total number of cars sold in January, February and March by the three shops?

- a. 3:5:8 b. 2:3:5 c. 3:4:5 d. 5:3:7

Answer: Option a

Explanation:

Data given -

Shops/Month	A	B	C
Jan			
Feb			
Mar			
Total	460	320	500

A on January (A_J) = C on January (C_J)

A on March (A_M) = C on March (C_M)

A on February (A_F) = 120

$A_F = \frac{1}{2}(C_M)$

$C_M = 120 \times 2 = 240$

$C_M = A_M = 240$

Shops/Month	A	B	C
Jan			
Feb	120		
Mar	240		240
Total	460	320	500

$A_J = 460 - 240 - 120 = 100 = C_J$

Shops/Month	A	B	C
Jan	100		100
Feb	120		
Mar	240		240
Total	460	320	500

$C_F = 500 - 240 - 100 = 160$

$B_F = A_F$

Shops/Month	A	B	C
Jan	100		100
Feb	120	120	160
Mar	240		240
Total	460	320	500

B sold 120 in February. The remaining (320-120) 200 is divided on the ratio 1:4 (Jan:Mar)

200 in 1:4 = 40:160

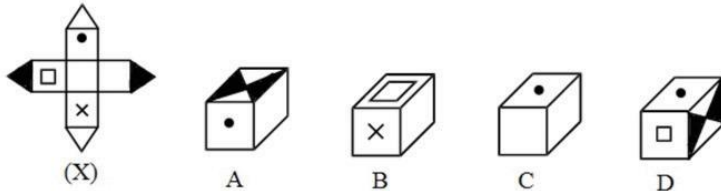
Shops/Month	A	B	C	Total(Row)
Jan	100	40	100	240
Feb	120	120	160	400
Mar	240	160	240	640
Total	460	320	500	

January: February: March = 240:400:640 = 3:5:8

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Q5. The figure marked 'X' is folded to form a box. Assuming that the paper used for the box is opaque and the signs, shaded triangles have to be visible on the outer side of the box, four possible box formations - A, B, C and D are given below. Some of which can be formed and some cannot be formed. Choose from the alternatives the boxes that can be formed.



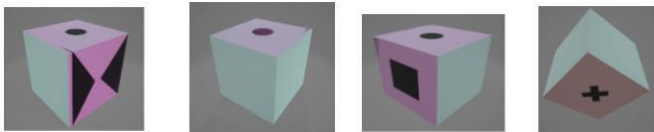
- a. A and C only b. C and D only
c. A, B and C d. All of A, B, C and D

Answer: Option c

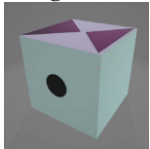
Explanation:

Problem statement:

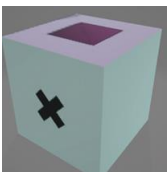
If we fold the image given in the problem statement, we will get the below images



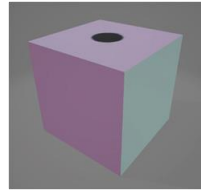
If we rotate our problem statement and compare with the images are given in the alternatives, we will get



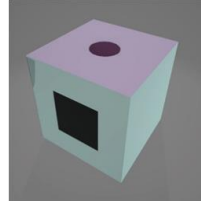
Hence, alternative A is a possibility.



As seen above, alternative B is also a possibility.



As seen above, alternative C is also a possibility.



This pattern is not matching with alternative D.

Hence, the three alternatives A, B and C can be formed.
Answer is **option c**.

Q6. 60, 48, 38, 28, 24, 20, 18

What is the wrong number in the sequence?

- a. 28 b. 38 c. 60 d. 18

Answer: Option a

Explanation:

Let's observe the pattern from right most number given in the series: 60, 48, 38, 28, 24, 20, 18

$$18 + 2 = 20$$

$$20 + 4 = 24$$

$$24 + 4 = 28$$

$$28 + 10 = 38$$

$$48 + 12 = 60$$

First the number is getting increased by +2 but after 20 the increment becomes 4 (twice). If we observe the last two terms they are getting increased by +2. This gives us a clue that from Right to Left the term in the series should get increased by +2. But it is not happening at term 28, so it is the odd term in the given series.

The correct series would be:

$$18 + 2 = 20$$

$$20 + 4 = 24$$

$$24 + 6 = 30$$

$$30 + 8 = 38$$

$$38 + 12 = 60$$

Hence the correct answer is Option a.

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Q7. A workman starts his work on Monday, works for 8 days and takes every 9th day as his holiday. His 12th holiday will fall on:
a. Monday b. Wednesday c. Thursday d. Tuesday

Answer: Option b

Explanation:

Starting from Monday, he works for 8 days and 9th day will be taken as a holiday. His every holiday cycle contains a total of 9 days. And, in total we have 12 holidays. Hence there should be 12 working cycles.

Thus,

Total no. of days = $12 \times 9 = 108$

No. of odd days = $108/7 = Q(15) \text{ \& } R(3)$

It starts from Monday and completed 15 weeks(cycles) - Monday to Sunday

We have Remainder of 3(last cycle). We know that the last day of last cycle will be our 12th holiday.

Remainder 1 - Monday

Remainder 2 - Tuesday

Remainder 3 - Wednesday

Hence, the 12th holiday will fall on Wednesday.

Q8. For any two numbers, we define an operation $\$$ yielding another number $X \$ Y$ such that the following condition holds: $X \$ X = 0$.

Also, for all X , $X \$ (Y \$ Z) = X \$ Y + Z$.

Find the value of $2012 \$ 0 + 2012 \$ 1912$.

a. 2112 b. 100 c. 5936 D. Cannot be determined

Answer: Option a

Explanation:

Given that $X \$ X = 0$ is possible only if $\$$ represents subtraction operation.

Also, $x \$ (y \$ z) = x - (y - z) = x - y + z$

It can be written as $x \$ y + z$

$2012 - 0 + 2012 - 1912 = 2112$

Q9. A very special island is inhabited only by knights and knaves. Knights always tell the truth, and knaves always lie. You meet four inhabitants: Usha, Eesha, Nisha and Asha. Usha tells you 'Eesha is a knave'. Eesha tells you 'Asha is a knave'. Nisha claims, 'Eesha is a knight and Asha is a knave'. Asha tells you, 'I and Nisha are different.' Identify the knave(s).

a. Eesha only
c. Eesha and Nisha

b. Usha only
d. Nisha and Asha

Answer: Option c

Explanation:

Let's assume that Usha is a Knight and tells the truth

Said by	Knights (Truth)	Knives (Lie)
Usha	Usha	Eesha

Eesha tells us that Asha is a knave, which must be a lie as Eesha is a Knave. So, Asha must be a knight.

Said by	Knights (Truth)	Knives (Lie)
Usha	Usha	Eesha
Eesha	Asha	

Nisha says Eesha is a knight, which cannot be true as we assumed Usha to be a Knight and she told Eesha is a Knave. So, Nisha must be telling a lie and she must be a knave. Since we got Nisha to be a knave, her second statement must be false. So Asha must be a knight.

Asha(Knight) says, I and Nisha are different - Satisfies the assumption(Nisha is a knave)

Our assumption is correct as none of the statements contradicted with one another. So the knaves in this problem are Eesha and Nisha

Q10. The current age difference between 2 persons is 25. 9 years before the elder one's age was 6 times that of the younger one. What is the sum of their current ages?

a. 53 years b. 50 years c. 47 years d. 75 years

Answer: Option a

Explanation:

Let X and Y be the ages of the two persons.

$X - Y = 25$

$X = Y + 25$ ----- Eq 1

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Before 9 years,
 $X - 9 = 6$ (Y - 9) ----- Eq 2

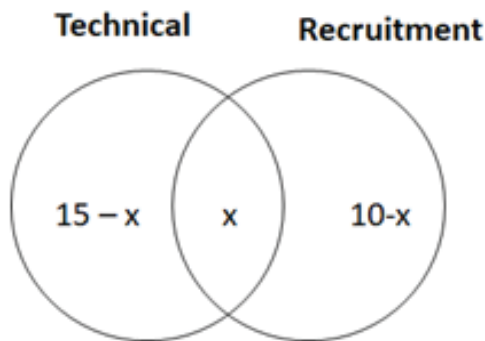
Substituting Eq 1 on 2

$$\begin{aligned} Y + 16 &= 6(Y - 9) \\ 5Y &= 70 \\ Y &= 14 \\ X &= 39 \\ X + Y &= 53 \end{aligned}$$

Q11. According to the stock policy of a company, each employee in the technical division is given 15 shares of the company and each employee in the recruitment division is given 10 shares. Employees belonging to both committees get 25 shares each. There are 20 employees in the company, and each one belongs to at least one division. The cost of each share is Rs. 10. If the technical division has 15 employees and the recruitment division has 10 employees, then what is the total cost of the shares given by the company?
a. Rs. 2650 b. Rs. 3180 c. Rs. 3250 d. Rs. 3120

Answer: Option c

Explanation:



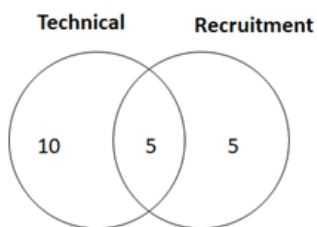
WKT

$$A \cup B = A + B - A \cap B$$

Here A = Technical Division, B = Recruitment Division

$$20 = 15 + 10 - A \cap B$$

$$A \cap B = 5$$



Employee belonging to Technical division only = $15 - 5 = 10$
Number of shares = $10 \times 15 = 150$ shares
Employee belonging to Recruitment division only = $10 - 5 = 5$
Number of shares = $5 \times 10 = 50$ shares
Employees belonging to both communities = 5
Number of shares = $5 \times 25 = 125$ shares
Total shares = $150 + 50 + 125 = 325$ shares
Total cost of the shares = 325×10
= Rs. 3250

Q12. If $5+3+2 = 151022$, $9+2+4 = 183652$, $8+6+3 = 482466$ and $5+4+5 = 202541$, then $7+2+5$
a. 143547 b. 132234 c. 2577224 d. 112321

Answer: Option a

Explanation:

Let's observe the pattern:

$$5+3+2 = (5 \times 3) \mid (5 \times 2) \mid (5 \times 3 + 5 \times 2 - 3) = 15 \mid 10 \mid 22 = 151022$$

Pattern: (Left most digit * Second Digit) | (Left most digit * Right most digit) | (Left most digit * Second Digit) + (Left most digit * Right most digit) - Second digit)

$$9+2+4 = (9 \times 2) \mid (9 \times 4) \mid (9 \times 2 + 9 \times 4 - 2) = 18 \mid 36 \mid 52 = 183652$$

$$8+6+3 = (8 \times 6) \mid (8 \times 3) \mid (8 \times 6 + 8 \times 3 - 6) = 48 \mid 24 \mid 66 = 482466$$

$$5+4+5 = (5 \times 4) \mid (5 \times 5) \mid (5 \times 4 + 5 \times 5 - 4) = 20 \mid 25 \mid 41 = 202541$$

So,

$$7 + 2 + 5 = (7 \times 2) \mid (7 \times 5) \mid (7 \times 2 + 7 \times 5 - 2) = 14 \mid 35 \mid 47$$

Q13. In an office, at various times during the day the boss gives the secretary a letter to type, each time putting the letter on top of the pile in the secretary's inbox. When there is time, the secretary takes the top letter off the pile and types it. If there are five letters in all, and the boss delivers them in the order 1 2 3 4 5, which of the following could NOT be the order in which the secretary types them?

a. 12345 b. 24351 c. 32415 d. 45231

Answer: Option d

Explanation:

Let's check the option sequence:

1 2 3 4 5: the boss delivers 1, then the secretary does 1, then the boss delivers 2, then the secretary does 2, etc. up to 5. Hence this is a possible case.

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2 4 3 5 1: the boss delivers 1, then delivers 2, then the secretary does 2, then the boss delivers 3 and 4 before the secretary completes 2, after completing 2 the secretary does 4, then the secretary does 3, then the boss delivers 5, then the secretary does 5, then the secretary does 1. Hence, this is a possible case.

3 2 4 1 5: the boss delivers 1, then delivers 2, then delivers 3, then the secretary does 3, then does 2, then the boss delivers 4, then the secretary does 4, then does 1, then the boss delivers 5, then the secretary does 5. Hence this is a possible case.

4 5 2 3 1: In order for the secretary to start with 4, the boss must deliver 1, 2, 3, and 4, then the secretary does 4. To get 5 next, the boss next delivers 5, then the secretary does 5, but now we can't get 2, 3, 1: the remaining letters must start with 3, which is on the top of the pile.

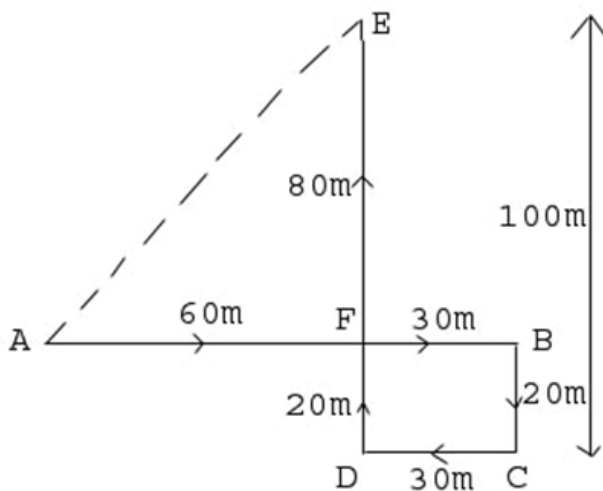
Hence, 4 5 2 3 1 cannot be the order.
So, the correct answer option is **d. 4 5 2 3 1**

Q14. A child was looking for his father. He went 90 metres in the East before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here he went 100 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?

a. 90 b. 30 c. 80 d. 100

Answer: Option d

Explanation:



Clearly, the child moves from A to B 90 metres eastwards up to B, then turns right and moves 20 metres up to C, then turns right and

moves up to 30 metres up to D. Finally, he turns right and moves up to 100 metres up to E.

So, $AB = 90$ m, $BF = CD = 30$ m,

So, $AF = AB - BF = 60$ metre

Also, $DE = 100$ metre, $DF = BC = 20$ metre

So, $EF = DE - DF = 80$ metre

As we can see in the image that triangle AFE is a right-angled triangle and we are having two sides, we need to calculate the third one.

By applying Pythagoras theorem

$$AE^2 = AF^2 + EF^2$$

$$= 60^2 + 80^2$$

$$= 3600 + 6400$$

$$= 10000$$

$$AE^2 = 100^2$$

$$AE = 100$$

Q15. F, G, H, J, K, L, M and N are 8 people. They need to be grouped into two with the following conditions:

- F and J must be in the same group
- G and N must be in different groups
- H and L must be in the same group
- M and G are not in the same group

Find the correct ordering of groups

a. FJ, KL, MN, GH

b. FH, JL, MN, GK

c. FJ, HL, MN, GK

d. FJ, HL, MN, GH

Answer: Option c

Explanation:

F and J must be in the same group

H and L must be in the same group

If we see the options,

In option a: FJ, KL, MN, GH

H and L are not together

In option b: FH, JL, MN, GK

H and L are not together

In option d: FJ, HL, MN, GH

H and G are together, which is not possible.

In option c: FJ, HL, MN, GK

First condition: F and J are together FJ, HL, MN, GK

Second Condition: G and N are in different group FJ, HL, MN, GK

Third Condition: H and L are in the same group FJ, HL, MN, GK

Fourth Condition: M and G are not in the same group FJ, HL, MN, GK

GK

Option c satisfies all the conditions.

H3. Numerical Ability

Q1.

The value of $\frac{(6.43)^2 + 33.3074 + (5.18)^2}{6.43 \times 41.3449 - 10.36 \times 2.59 \times 5.18}$ lies between

- a. 0.1 and 0.5 b. 0.5 and 1
c. 1 and 1.2 d. 1.2 and 1.5

Answer: Option b

Explanation:

Let's assume $A = 6.43$ and $B = 5.18$

Numerator

- a. $6.43 \times 6.43 = A^2$
b. $5.18 \times 5.18 = B^2$
c. $33.3074 = A \times B$
Numerator = $A^2 + AB + B^2$

As per BODMAS,

Denominator:

- a. $6.43 \times 41.3449 = 6.43 \times 6.43 \times 6.43 = A^3$
b. $10.36 \times 2.59 \times 5.18 = 5.18 \times 2 \times 2.59 \times 5.18 = B^3$

Denominator = $A^3 - B^3$, this can also be written as $(A^2 + AB + B^2)(A - B)$

Numerator/Denominator = $(A^2 + AB + B^2) / (A^2 + AB + B^2)(A - B) = 1 / (A - B) = 1 / (6.43 - 5.18) = 1 / 1.25 = 0.8$

0.8 is between 0.5 and 1.

Q2. A's capital exceeds B's capital by 20.5%. B invests his capital at 20% p.a for 3 years, interest compounded annually. At what rate percentage p.a must A invest his capital at simple interest so that at the end of 3 years, both get the same amount (in INR)? (Correct to one decimal place)

- a. 13.8 b. 14.2 c. 14.5 d. 15.2

Answer: Option c

Explanation:

Let's assume B invests Rs. X and A invests Rs. $X + 20.5\%$ of $X = 1.205X$

B invests his capital at 20% p.a for 3 years (compounded annually)

$$\text{Amount}(C.I) = P(1+r/100)^n = X(1+20/100)^3 = 1.728X$$

A invests his capital $(1.205X)$ at R interest at S.I for 3 years

$\text{Amount}(S.I) = P + PNR/100 = 1.205X + (1.205X \times 3 \times R)/100 =$
It has been given that amount should be equal.

$$1.728X = 1.205X (1 + 3R/100)$$

$$1.4340 = 1 + 3R/100$$

$$1.4340 - 1 = 3R/100$$

$$3R = 43.40$$

$$R = 43.40/3$$

$$R = 14.46 \text{ approximately equals } 14.5$$

Q3. Trains A and B start moving at the same time from stations X and Y, respectively towards each other on parallel tracks. After passing each other, A and B take x hours and 8 hours to reach Y and X, respectively. If the speed of B is 25% more than that of A, then what is the value of x?

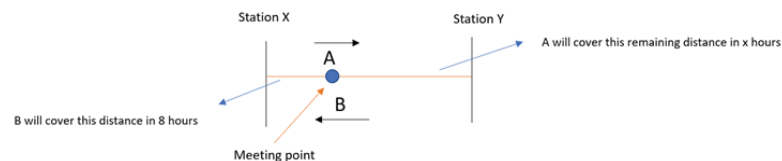
- a. 10 b. $10\frac{1}{2}$ c. $12\frac{1}{2}$ d. 12

Answer: Option c

Explanation:

Since B's speed is more than A, B would have covered more distance than A, when they met.

Let's assume that they meet at this point



Let's assume the distance between Station X and meeting point as D_1 and distance between station Y and meeting point as D_2 .

It has been given Speed of B (S_B) = $1.25 \times$ Speed of A (S_A)

If speed ratio of $S_A : S_B = 1 : 1.25$, which can also be written as 4:5

then time ratio will be $T_A : T_B = 5:4$

B took 8 hours to cover D_2 , using the time ratio (5:4) we can find A covers the same distance in 10 hours. This means that from the time when A started from station X, A travelled for 10 hours to reach the meeting point.

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It is clearly given in the problem that both start at the same time, if A starts and takes 10 hours to reach the meeting point, B would have also taken 10 hours to reach the meeting point, which is Station Y to meeting point(D2)

D2 was covered by B in 10 hours and A took X hours to cover D2. With the help of time ratio again ($T_A:T_B = 5:4$), if B is 10 hours, 4 parts = 10, 1 part = 2.5.

5 parts of A would be $5 \times 2.5 = 12.5$ hours.

X = 12.5 hours

Q4. For the data

Marks obtained	Below 10	Below 20	Below 30	Below 40	Below 50
No. of students	5	16	28	42	72

If x is the class mark of the modal class and y is the upper limit of the median class, then the value of $(2x+y)$ is

- a. 95 b. 125 c. 130 d. 135

Answer: Option c

Explanation:

The cumulative number of students has been given in the question, let's find the number of students belonging to each category. i.e number of students scored between 0-10, 10-20, 20-30

For example: To find the number of students in the 10-20 category, we have to subtract those who scored less than 10 from the total number of students scored less than 20. i.e $16 - 5 = 11$

Marks scored between	Number of students	Cumulative number
0-10	5	5
10-20	11	16
20-30	12	28
30-40	14	42
40-50	30	72

Modal class = Category with maximum number of students
As per the data, category 40-50 has 30 students. So our modal class is 40-50

It is given that x is the class mark of modal class.

Class mark = $(\text{lower limit} + \text{upper limit}) / 2$

Class mark of the modal class(x) = $(40+50)/2 = 45$

As per the question statement, y is the upper limit of median class.
Median class = class where $n/2$ is achieved, where n is the total number of students

$n/2 = 72/2 = 36$

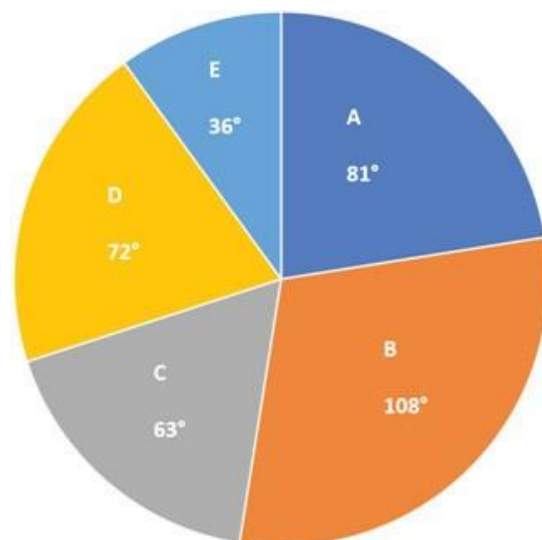
We got the 36th student in the 30-40 category. It is mentioned that y is the upper limit of median class

y = upper limit of 30-40 = 40

If x = 45 and y = 40, then $2x+y = 2(45)+40 = 90+40 = 130$

Q5. Study the following pie chart and answer the question:

Breakup of the total number of employees of a company in its five offices in city A, B, C, D and E



Total number of employees = 2400

If one-third of the total number of employees of the company in offices in cities B and D are shifted to offices in cities C and E in the ratio 2:3, the difference between the number of employees in offices in cities C and E is

- a. 160 b. 100 c. 120 d. 90

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Answer: Option b

Explanation:

Total number of employees, $360^\circ = 2400$

$1^\circ = 2400/360$

Number of employees in city B = $108^\circ = 108 * 2400/360 = 720$

Number of employees in city D = $72^\circ = 480$

$\frac{1}{3}$ of (City B and D) = $\frac{1}{3} (720+480) = 400$

400 employees are shifting to company C and E in the ratio 2:3.5

parts = 400

1 part = 80, then 2:3 is 160 & 240

Existing employees in city C = $63^\circ = 63 * 2400/360 = 420$

New count = $420 + 160 = 580$

Existing employees in City E = $36^\circ = 36 * 2400/360 = 240$

New count = $240 + 240 = 480$

Difference between the number of employees in C and E = $580 - 480 = 100$

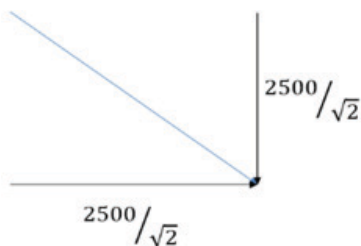
Q6. Whenever a force acts on a body obliquely, it's split into vertical and horizontal components for further analysis. If the force acting on a stone has the same horizontal and vertical components of value $2500/\sqrt{2}$ newtons, what's the value of oblique force?

- a. $2500/2$ b. 2500 c. $2500/4$ d. 1500

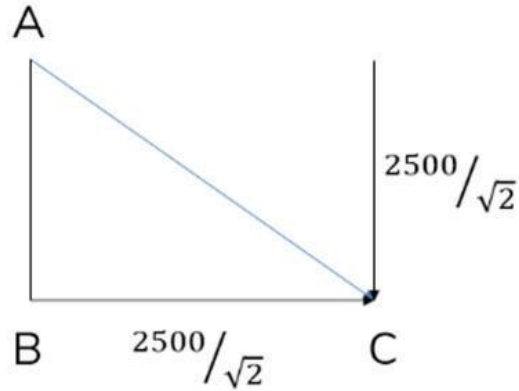
Answer: Option b

Explanation:

Force acting on a stone splits into vertical and horizontal components and has same value $2500/\sqrt{2}$



In order to find the value of the oblique force, let's form a right-angled triangle and find the answer.



To find the oblique force, let's find the value of AC

$$AC^2 = AB^2 + BC^2$$

$$AC^2 = (2500/\sqrt{2})^2 + (2500/\sqrt{2})^2$$

$$AC^2 = 2500^2/2 + 2500^2/2$$

$$AC = 2500$$

Q7. A shop sells chocolates. It used to sell chocolates for Rs.2 each, but there were no sales at that price. When he reduced the price, all chocolates sold out enabling the shopkeeper to realize Rs. 164.90 from the chocolates alone. If the new price was not less than half the original price quoted. How many chocolates were sold (at the reduced price)?

- a. 39 b. 97 c. 37 d. 71

Answer: Option b

Explanation:

Let the number of chocolates be x and price per chocolate be y
New price of the chocolates is not less than half of the quoted price, which means our answer should be between 1 and 2

Quoted price = Rs. 2.

New price will be not less than Rs. 1.

$x*y$ = Between 1 and 2. The options given are the values of X. Let's substitute and find which option gives y value between 1 and 2,

Options a: $y = 164.9/39 = \text{Rs. } 4.22$

Options b: $y = 164.9/97 = \text{Rs. } 1.7$

Option c: $y = 164.9/37 = \text{Rs. } 4.45$

Option d: $y = 164.9/71 = \text{Rs. } 2.32$

In all the options except 2, the selling price is more than Rs. 2. It should be less than Rs. 2.

So, answer is option b.

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Alternate method:

$xy = \text{Rs. } 164.90 = 16490 \text{ paise}$

Now, writing 16490 as multiple of prime factors,

$$16490 = 2 * 5 * 17 * 97$$

As the price of a chocolate should be between 100 paise to 200 paise, the possible product combination is either $2 * 5 * 17$ or $97 * 2$.

Case 1: $(2 * 5 * 17) \times 97 = 170$ paise and 97 chocolate = Rs. 1.70 and 97 Chocolate

Case 2: $(97 * 2) \times (17 * 5) = 194$ paise and 85 chocolate = Rs. 1.94 and 85 Chocolate

So, as per the given answer option B (from the case 1) is the correct answer as there is no option given as 85.

Q8. A sum of Rs. 3000 is distributed amongst A, B and C. A gets $\frac{2}{3}$ of what B and C got together and C gets $\frac{1}{3}$ of what A and B got together. C's share is:

- a. Rs. 1200 b. Rs. 2250 c. Rs. 750 d. Rs. 1050

Answer: Option c

Explanation:

$$A's \text{ share} + B's \text{ share} + C's \text{ share} = 3000 \text{----- Eq 1}$$

$$A = \frac{2}{3}(B+C) \text{----- Eq 2}$$

$$\text{Also, } C = \frac{1}{3}(A+B)$$

$$A + B = 3C \text{----- Eq 3}$$

Put the value of C in Eq (1)

$$A+B+C = 3000$$

$$3C + C = 3000$$

$$C = \text{Rs. } 750$$

Hence C's share will be Rs. 750

Q9. Assume that $f(1)=0$ and $f(m+n)=f(m)+f(n)+4(9mn-1)$. for all the natural numbers (integers >0) m & n.

What is the value of $f(17)$?

- a. 5436 b. 4831 c. 5508 d. 4832

Answer: Option d

Explanation:

Given that $f(1) = 0$ and $f(m+n)=f(m) + f(n)+ 4(9mn-1)$.

Where m and n are positive integers, in order to find the value of $f(17)$, we should assume the values of m and n

Let's substitute 16 and 1 (for m and n) so that we get $m+n$ to be 17
 $f(17) = f(16+1) = f(16)+f(1)+4(9*16*1 - 1) = f(16) + 0 + 572$

To find the value of $f(17)$, we should know the value of $f(16)$

Let's substitute $m=8$ and $n=8$ so that we get as the total as 16

$$f(16) = f(8+8)=f(8)+f(8)+4(9*8*8 - 1)$$

To find $f(16)$, we should know $f(8)$

Let's substitute $m = 4$ and $n = 4$

$$f(8) = f(4+4)=f(4)+f(4)+4(9*4*4 - 1)$$

To find $f(8)$, we should know the value of $f(4)$

Let's substitute $m = 2$ and $n = 2$

$$f(4) = f(2+2)=f(2)+f(2)+4(9*2*2 - 1)$$

$f(2)$ can be found by substituting 1 for m and n ($m = 1$; $n = 1$)

$$f(2) = f(1+1)=f(1)+f(1)+4(9*1*1 - 1) = 0+0+4*8 = 32$$

$$f(4) = f(2+2)=f(2)+f(2)+4(9*2*2 - 1) = 32+32+4*35 = 204$$

$$f(8) = f(4+4)=f(4)+f(4)+4(9*4*4 - 1) = 204+204+4*143 = 980$$

$$f(16) = f(8+8)=f(8)+f(8)+4(9*8*8 - 1) = 980+980+4*575 = 4260$$

$$f(17) = f(16+1) = f(16)+f(1)+4(9*16*1 - 1) = 4260+0+ 4*143 = 4832$$

Q10. A number divided by 357 leaves 5 as remainder. If the number is divided by 17, what is the remainder?

- a. 9 b. 3 c. 5 d. 7

Answer: Option c

Explanation:

Example: $149/24 = R(5)$

Let's take the factors of 24 which can produce remainder 5.

Factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24

6, 8, 12 are the numbers which can produce remainder 5. If we divide 149 with any of these 3 numbers, it will always give us remainder 5 (same as the parent number)

In the same way, In this problem, $X/357 = R(5)$, all the eligible factors of 357 will provide the same 5 dividing the X.

Factors of 357 = 1, 3, 7, 17, 21, 51, 119, 357

17 is a multiple of 357, it will also provide the same remainder (5).

Alternate method:

Here 357 can be written in multiples of 17.

$$357 = 17*21.$$

From the dividend rule:

$$\text{Dividend} = \text{Divisor} * \text{Quotient} + \text{Remainder}$$

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Let the dividend or number be n and the quotient be x .

So, it can be written as

$$n = 357x + 5$$

$$n = 17(21)x + 5$$

The remainder will be 5 in this case too.

Q11. A girl entered a store and bought x flowers for y dollars (x and y are integers). When she was about to leave, the clerk said, "If you buy 10 more flowers I will give you all For \$2, and you will save 80 cents a dozen". The values of x and y are:

- a. 15, 1 b. 10, 1 c. 5, 1 d. Cannot be determined

Answer: Option c

Explanation:

She bought x flowers for y dollars.

So, 1 flower cost = y/x

12 flower or 1 dozen flower cost = $12y/x$

Again, $x + 10 = 2$ dollars

1 flower cost = $2/(10+x)$

12 flower or 1 dozen cost = $(2 \times 12) / (10 + x) = 24/(10+x)$

Given that this new dozen cost is 80 cents.

$$80 \text{ cents} = 80/100 \text{ dollars} = 4/5$$

We know that: She will save 80 cents a dozen

$$(12y/x) - [24/(10+x)] = 4/5 \text{ -----Eqn (1)}$$

$$\text{L.H.S} = (12y/x) - [24/(10+x)]$$

$$\text{R.H.S.} = 4/5$$

Only option which gives the $4/5$ as a value when put in L.H.S. will be the answer.

Now let's check the options:

Option A: $x = 15; y = 1$

$$12/15 - 24/11 \neq 3/4$$

Option B: $x = 10; y = 1$

$$(12/10) - (24/25) \neq 3/4$$

Option C: $x = 5; y = 1$

$$12/5 - 24/15 = 3/4$$

Hence, option c is the correct answer.

Q12. The letters in the word ROADIE are permuted in all possible ways and arranged in alphabetical order. Find the word in the 44th rank.

- a. AERIOD b. AERDOI c. AERODI d. AEODRI

Answer: Option b

Explanation:

Observe the letters used to frame the word ROADIE. If we try to arrange them in alphabetical order then the first rank should be ADEIOR

To calculate the rank let's take the number of letters which will start from A first.

A _____ = $A \times 5 \text{ ways} \times 4 \text{ ways} \times 3 \text{ ways} \times 2 \text{ ways} \times 1 \text{ way}$ (In rank question if nothing is given then we always assuming there is no repetition)

So total letter which will be formed with starting letter A = 120

It means that the 44th rank word will start with A

Now, let fix the letter A and D

$$AD \text{ _____} = A \times D \times 4 \text{ ways} \times 3 \text{ ways} \times 2 \text{ ways} \times 1 \text{ way} = 4! = 24$$

AD sequence will get over at 24th rank. But we need 44th rank. So we need to check for the next alphabet.

The next sequence will be A E with 24 such words so we will reach at 48 rank. So our answer will start with AE

Since we confirmed it starts with AE, Let's fix 3 letters and narrow down the possibilities

$$AED \text{ ---} \Rightarrow 3! = 6 \text{ --- } 24 \text{ ranks (AD)} + 6 = 30$$

$$AEI \text{ ---} \Rightarrow 3! = 6 \text{ --- } 30 \text{ ranks} + 6 = 36$$

$$AEO \text{ ---} \Rightarrow 3! = 6 \text{ --- } 36 \text{ ranks} + 6 = 42$$

Next will letter after AEO will be AE R sequence:

$$\text{AERDIO} \Rightarrow 43\text{th}$$

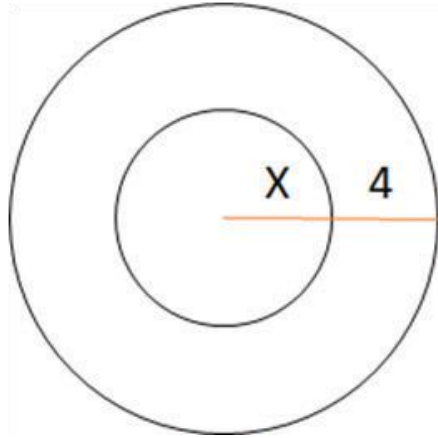
$$\text{AERDOI} \Rightarrow 44\text{th}$$

Q13. There is a pool of radius X feet and there is a pathway around the pool with a width of 4 feet. Find the radius of the pool if the path area/pool area = $11/25$.

- a. 12 b. 20 c. 25 d. 29

Answer: Option b

Explanation:



To find the path area, we should subtract the pool area from the total area of the circle (pool + path)

Area of pool / Area of path = 11/25

Since π is common in both numerator and denominator, it will get cancelled.

$$[(x+4)^2 - x^2] / x^2 = 11/25$$

$$(x+4)^2 / x^2 = (11/25) + 1$$

$$[(x+4)/x]^2 = 36/25$$

$$(x+4)/x = (6/5)^2$$

$$(x+4)/x = 6/5$$

$$5x + 20 = 6x$$

$$X = 20 \text{ feet}$$

Q14. 6 tasks and 6 persons. P1 and P2 do not do task T1. T2 is assigned to P3 or P4. Each person should be assigned with at least 1 task. In how many ways the task can be assigned?

- a. 192 b. 360 c. 144 d. 180

Answer: Option c

Explanation:

There are 6 tasks T1, T2, T3, T4, T5, T6

And 6 people P1, P2, P3, P4, P5, P6.

If T2 is assigned to P3 (1 way), there are 5 remaining tasks T1, T3, T4, T5, T6 and 5 remaining people P1, P2, P4, P5, P6.

T1 can't be assigned to P1 or P2, so T1 could be assigned to P4, P5, P6 = 3 ways

T3 could be assigned to each of 4 remaining people = 4 ways

T4 could be assigned to each of 3 remaining people = 3 ways

T5 could be assigned to each of 2 remaining people = 2 ways

T6 could be assigned to the only remaining people = 1 way

Hence, the total combination in this case is $3 \times 4 \times 3 \times 2 \times 1 = 72$ ways

If T2 is assigned to P4. The result is the same as the first case above.

The total combination is 72 ways again

Answer = $72 + 72 = 144$ ways

Q15. Car A leaves city C at 5 pm and drives at a speed of 40 kmph. 2 hours later another car B leaves city C and drives in the same direction as car A. In how much time will car B be 9 km ahead of car A if the speed of car B is 60 kmph?

- a. 4.25 hours b. 4.17 hours c. 4.30 hours d. 4.45 hours

Answer: Option d

Explanation:

Speed of car A = 40 kmph,

Speed of car B = 60 kmph

Distance travelled by A in 2 hours.

Distance = Speed * Time = $40 \times 2 = 80$ km

Distance B must travel to be 9 km ahead of A = $80 \text{ km} + 9 \text{ km} = 89 \text{ km}$

Relative speed of A and B = $60 - 40 = 20$ kmph

Time taken by B to be 9 km ahead of A:

Time = Distance / Speed = $89 \text{ km} / 20 \text{ kmph} = 4.45$ hours

H4. Programming Logic

Q1. What is the output of this program?

```
#include <iostream>
using namespace std;
int main( )
{
    char line[100];
    cin.getline( line, 100, 't' );
    cout << line;
    return 0
}
```

- a. 100
- b. t
- c. It will print whatever strings we store
- d. None of the mentioned

Answer: Option c

Explanation:

The program will store all strings entered and will print them only when the character 't' is encountered.

Input >> coding
Input >> is fun
Input >> t

Output:
coding
is fun

Q2. Predict the output

```
#include<iostream>
using namespace std;
```

```
int &fun()
{
    static int x=10;
    return x;
}
int main()
{
    fun() = 30;
```

```
    cout << fun();
    return 0;
}
```

- a. 30
- b. 10
- c. Error
- d. Segmentation fault

Answer: Option a

Explanation:

When a function returns by reference, it can be used as lvalue. Since x is a static variable, it is shared among function calls and the initialization line "static int x = 10;" is executed only once. The function call fun() = 30, modifies x to 30. The next call "cout << fun()" returns the modified value.

Q3. Predict the output

```
#include <iostream>
using namespace std;
```

```
int main()
{
    int a = 32, *ptr = &a;
    char ch = 'A', &cho = ch;

    cho += a;
    *ptr += ch;
    cout << a << ", " << ch << endl;
    return 0;
}
```

- a. 32, A
- b. 32, a
- c. 129, a
- d. 129, A

Answer: Option c

Explanation:

The "ptr" variable is a pointer which holds the address of variable "a". And "*ptr" returns the value of "a" variable. "cho" is a reference variable to "ch". So any change made to "cho" will be reflected to "ch". As such, when "cho" is increased by 32, it adds to the ASCII value of "A" (which is 65), and this results to 97 which is the ASCII value of "a" (from the alphabet). So this "a" gets stored in "ch". As for when "*ptr" is incremented by "ch", it gives value 97+32=129.

Q4. What will be the output of the following C++ code?

```
#include <iostream>
using namespace std;
int main()
{
    int arr[] = {4, 5, 6, 7};
    int *p = (arr + 1);
    cout << *p;
    return 0;
}
```

- a. 4 b. 5 c. 6 d. 7

Answer: Option b

Explanation:

We are making the pointer point to the next value and are printing it. Thus, the answer will be option b (5).

Q5. What will be the output of the following C++ code?

```
#include <iostream>
using namespace std;
int main()
{
    int a = 5, b = 10, c = 15;
    int *arr[] = {&a, &b, &c};
    cout << arr[1];
    return 0;
}
```

- a. 5 b. 10 c. 15 d. It will return some random number

Answer: Option d

Explanation:

Array element cannot be address of auto variable. It can be address of static or extern variables.

Q6. What will be the output of the following C++ code?

```
#include <stdio.h>
#include <iostream>
using namespace std;
int main ()
```

```
{
    int array[] = {0, 2, 4, 6, 7, 5, 3};
    int n, result = 0;
    for (n = 0; n < 8; n++)
    {
        result += array[n];
    }
    cout << result;
    return 0;
}
```

- a. 25 b. 26 c. 27 d. 21

Answer: Option c

Explanation:

We are adding all the elements in the array and printing it. The total number of elements in the array is 7, but the for loop will go beyond 7 and add a garbage value.

Q7. What will be the output of the following C++ code?

```
#include <stdio.h>
#include <iostream>
using namespace std;
int main()
{
    int array[] = {10, 20, 30};
    cout << -2[array];
    return 0;
}
```

- a. -15 b. -30 c. compile time error d. garbage value

Answer: Option b

Explanation:

The program will print the negative value of the concerned element. Index value Array[2]=30. So, the answer is -30.

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Q8. What is the return value of $f(p, p)$ if the value of p is initialized to 5 before the call? Note that the first parameter is passed by reference, whereas the second parameter is passed by value.

```
int f(int &x, int c) {  
    c = c - 1;  
    if (c == 0) return 1;  
    x = x + 1;  
    return f(x, c) * x;  
}
```

- a. 3024 b. 6561 c. 55440 d. 161051

Answer: Option b

Explanation:

Since c is passed by value and x is passed by reference, all functions will have same copy of x , but different copies of c .

$$f(5, 5) = f(x, 4) * x = f(x, 3) * x * x = \\ f(x, 2) * x * x * x = f(x, 1) * x * x * x * x = 1 * x * x * x * x = x^4$$

Q9. What will be the output of the following C++ code?

```
#include <stdio.h>  
#include <iostream>  
using namespace std;  
int main()  
{  
    int a = 5, b = 10, c = 15;  
    int arr[3] = {&a, &b, &c};  
    cout << *arr[*arr[1] - 8];  
    return 0;  
}
```

- a. 15 b. 18 c. Garbage value d. Compile time error

Answer: Option d

Explanation:

The conversion is invalid in this array. So, it will throw an error. The following compilation error will be raised:
cannot convert from 'int*' to 'int'

This is because $\&a$, $\&b$ and $\&c$ represent int^* whereas the array defined is of int type.

Q10. Which function is used to get the length of a string object?

- a. `str.length()` b. `str.size()`
c. `str.max_size()` d. Both `size()` and `length()` function

Answer: Option d

Explanation:

Both `size()` and `length()` are used to get the size of the string objects.

Q11. Which of the following is not a modifier function in string class?

- a. `operator+=()` b. `operator[]()`
c. `push_back()` d. `erase()`

Answer: Option b

Explanation:

`[]` operator is used to access one of the characters of the string objects whereas other functions are used to modify the string in some way.

Q12. Evaluate the following Java expression, if $x=3$, $y=5$, and $z=10$:

$++z + y - y + z + x++$

- a. 24 b. 23 c. 20 d. 25

Answer: Option a

Explanation:

In the expression given above, $++z$ means that the value will first increment by 1, then used. Now, evaluate the statement by putting the values of x , y , and z . On calculating, the final answer is 24, as shown below.

$$++z + y - y + z + x++ \\ 11 + 5 - 5 + 10 + 3 = 24$$

Q13. What will be the output of the following program?

```
public class Test {  
    public static void main(String[] args) {  
        int count = 1;  
        while (count <= 15) {  
            System.out.println(count % 2 == 1 ? "****" : "+++++");  
            ++count;  
        } // end while  
    } // end main  
}
```

- a. 15 times ***
- b. 15 times +++++
- c. 8 times *** and 7 times+++++
- d. Both will print only once

Answer: Option c

Explanation:

We have declared count = 1. The value of count will be increased till 14 because of the while (count<=15) statement. If the remainder is equal to 1 on dividing the count by 2, it will print (***) else print (+++++). Therefore, for all odd numbers till 15 (1, 3, 5, 7, 9, 11, 13, 15), it will print (***), and for all even numbers till 14 (2, 4, 6, 8, 10, 12, 14) it will print (+++++).

Hence, an asterisk (***) will be printed eight times, and plus (+++++) will be printed seven times.

Q14. Which of the following for loop declaration is not valid?

- a. for (int i = 99; i >= 0; i / 9)
- b. for (int i = 7; i <= 77; i += 7)
- c. for (int i = 20; i >= 2; - - i)
- d. for (int i = 2; i <= 20; i = 2* i)

Answer: Option a

Explanation:

The first option is not a valid declaration as i/9 is not declared correctly. The correct statement will be:

for (int i = 99; i >= 0; i = i/9)

Then the code would execute. But without assigning the value of i/9 to a variable, it would not execute, and an exception is thrown, as shown below.

Exception in thread "main" java.lang.Error: Unresolved compilation problem:

Syntax error on token "/", invalid AssignmentOperator

The other three statements are valid and will execute. Hence, the correct answer is the option a.

Q15. What will be the output of the following Java program?

```
class bitwise_operator
{
    public static void main(String args[])
    {
        int var1 = 42;
        int var2 = ~var1;
        System.out.print(var1 + "" + var2);
    }
}
```

- a. 42 42 b. 43 43 c. 42 -43 d. 42 43

Answer: Option c

Explanation:

Unary not operator, ~, inverts all of the bits of its operand. 42 in binary is 00101010 in using ~ operator on var1 and assigning it to var2 we get inverted value of 42 i.e 11010101 which is -43 in decimal.

Q16. What will be the output of the following Java program?

```
class comma_operator
{
    public static void main(String args[])
    {
        int sum = 0;
        for (int i = 0, j = 0; i < 5 & j < 5; ++i, j = i + 1)
            sum += i;
        System.out.println(sum);
    }
}
```

- a. 5 b. 6 c. 14 d. Compilation error

Answer: Option b

Explanation:

Using comma operator, we can include more than one statement in the initialization and iteration portion of the for loop. Therefore both ++i and j = i + 1 is executed i gets the value -0, 1, 2, 3, 4 & j gets the values -0, 1, 2, 3, 4, 5.

Q17. How many categories are containers divided into?

- a. 1 b. 2 c. 3 d. 4

Answer: Option d

Explanation:

Containers are divided into 4 categories, namely Sequence Containers, Associative Containers, Unordered Associative Containers and Container Adaptors.

Q18. Which of the following is a Non-modifying Sequence Operation?

- a. swap() b. transform() c. remove() d. search()

Answer: Option d

Explanation:

search() is a non-modifying sequence operation because while searching we never change anything whereas swapping, transforming and removing involves modifying the sequence in some way.

Q19. What will be the output of the following program?

```
public class MyFirst {
    public static void main(String[] args) {
        MyFirst obj = new MyFirst(n);
    }
    static int a = 10;
    static int n;
    int b = 5;
    int c;
    public MyFirst(int m) {
        System.out.println(a + "," + b + "," + c + "," + n + "," + m);
    }
}
// Instance Block
{
    b = 30;
    n = 20;
}
// Static Block
static
{
    a = 60;
}
```

- a. 10, 5, 0, 20, 0
b. 10, 30, 20
c. 60, 5, 0, 20
d. 60, 30, 0, 20, 0

Answer: Option d

Explanation:

There are two values of variable a, i.e., 10 and 60. Similarly, there are two values of variable b, i.e., 5 and 30. But in the output, the values of a and b are 60 and 30, respectively. It is because of the execution order of the program.

The execution order of the program is that the static block executes first, then instance block, and then constructor. Hence, the JVM will consider the value of a and b as 60 and 30 concerning the execution order. The value of a = 10 and b = 5 are of no use. And the value of variables c and m is 0 as we have not assigned any value to them.

Q20. Which of these operators is used to allocate memory for an object?

- A. malloc b. alloc c. new d. give

Answer: Option c

Explanation:

The operator new dynamically allocates memory for an object and returns a reference to it. This reference is address in memory of the object allocated by new.

H5. Coding

Q1. Sweet Seventeen

Given a maximum of four digits to the base 17 (10 -> A, 11 -> B, 12 -> C, 16 -> G) as input, output its decimal value.

Expected Input

1A

Expected Output

27

Sample Input:

23GF

Sample Output:

10980

Code Solution in C++:

```
1 #include <iostream>
2 #include <math.h>
3 #include <string.h>
4 using namespace std;
5 int main(){
6     char hex[17];
7     long long decimal;
8     int i = 0, val, len;
9     decimal = 0;
10    cin>> hex;
11    len = strlen(hex);
12    len--;
13    for(i = 0; hex[i]!='\0'; i++){
14        {
15            if(hex[i]>='0' && hex[i]<='9'){
16                val = hex[i] - 48;
17            }
18            else if(hex[i]>='a' && hex[i]<='g'){
19                val = hex[i] - 97 + 10;
20            }
21            else if(hex[i]>='A' && hex[i]<='G'){
22                val = hex[i] - 65 + 10;
23            }
24            decimal = decimal + val * pow(17, len);
25            len--;
26        }
27        cout<< decimal;
28        return 0;
29    }
30 }
```

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Q2. A Sober Walk

Our culture has had several great persons since time immemorial and King Vikramaditya's Nava Ratnas (nine gems) belong to this ilk. They are named in the following shloka:

धनवंतरी क्षषणकाडमरसिंह राडू चेठालमदृ धटकर्परः कर्मिदाक
ख्यति कराहमिहिरि नृस्ते समाभ्यम् रत्नति वै कस्मस्मिनति तिम्दम्

Among these, Varahamihira was an astrologer of eminence and his book Brihat Jataak is reckoned as the ultimate authority in astrology.

He was once talking with Amarasimha, another gem among the Nava Ratnas and the author of Sanskrit thesaurus, Amarakosha. Amarasimha wanted to know the final position of a person, who starts from the origin (0,0) and travels per following scheme.

He first turns and travels 10 units of distance
His second turn is upward for 20 units
Third turn is to the left for 30 units
Fourth turn is the downward for 40 units
Fifth turn is to the right (again) for 50 units

... And thus he travels,
every time increasing the travel distance by 10 units.

Constraints:

$2 \leq n \leq 1000$

Sample Input 1:

3

Sample Output 1:

-20 20

Sample Input 2:

4

Sample Output 2:

-20 -20

Code Solution in C++:

```
1 #include<iostream>
2 #include<stdlib.h>
3 using namespace std;
4 int main()
5 {
6     int n;
7     cin>>n;
8     char c = 'R';
9     int x = 0, y = 0;
10    while(n){
11        switch(c){
12            case 'R':
13                x = abs(x) + 10;
14                y = abs(y);
15                c = 'U';
16                break;
17            case 'U':
18                y = y + 20;
19                c = 'L';
20                break;
21            case 'L':
22                x = -(x + 10);
23                c = 'D';
24                break;
25            case 'D':
26                y = -(y);
27                c = 'R';
28                break;
29        }
30        n--;
31    }
32    cout<< x<< " " << y;
33 }
```

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Q3. Segregate 0s and 1s

Write a program to segregate 0s and 1s. You are given an array of 0s and 1s in random order. Segregate 0s on left side and 1s on right side of the array.

Sample Input:

6

0 1 0 1 1 1

Sample Output:

0 0 1 1 1 1

Code Solution in C++:

```
1 #include<iostream>
2 using namespace std;
3 void segregate0and1(int arr[], int n)
4 {
5     int count = 0;
6     for (int i = 0; i < n; i++)
7     {
8         if (arr[i] == 0)
9             count++;
10    }
11    for (int i = 0; i < count; i++)
12        arr[i] = 0;
13
14    for (int i = count; i < n; i++)
15        arr[i] = 1;
16 }
17 void print(int arr[], int n)
18 {
19     for (int i = 0; i < n; i++)
20         cout << arr[i] << " ";
21 }
22 int main()
23 {
24     int arr[100], n, i;
25     cin >> n;
26     for (i = 0; i < n; i++)
27         cin >> arr[i];
28     segregate0and1(arr, n);
29     print(arr, n);
30
31     return 0;
32 }
```


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Q4. Printing Unique Elements in an Array

Write a program to print all the unique elements in the given array.

Input Format:

The first line of input denotes the size of an array(N)

The remaining line of input denotes the 'N' elements.

Output Format:

Print all the unique elements

Sample Input:

5

1

1

2

2

3

Sample Output:

3

Code Solution in C++:

```
1 #include<iostream>
2 #include <stdio.h>
3 using namespace std;
4 int main()
5 {
6     int n,i,j,flag=0;
7     cin>>n;
8     int arr[n];
9     for(i=0;i<n;i++)
10    {
11        cin>>arr[i];
12    }
13    for(i=0;i<n;i++)
14    {
15        flag=0;
16        for(j=0;j<n;j++)
17        {
18            if(arr[i]==arr[j] && i!=j)
19            {
20                flag=1;
21                break;
22            }
23        }
24        if(flag==0)
25        {
26            cout<<arr[i]<<" ";
27        }
28    }
29    return 0;
30 }
```

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Q5. Binary to Octal

Write a program to convert the given binary number to its equivalent octal value.

Input Format:

Input consists of integer

Output Format:

Refer the sample output format

Sample Input:

10101

Sample Output:

25

Code Solution in C++:

```
1 #include<iostream>
2 #include<stdio.h>
3 using namespace std;
4 int power_fn(int base,int exp)
5 {
6     int i,sum=1;
7     for(i=0;i<exp;i++)
8     {
9         sum=sum*base;
10    }
11    return sum;
12 }
13 int main()
14 {
15     int binary,sum=0,rem,exp=0;
16     cin>>binary;
17     while(binary!=0)
18     {
19         rem=binary%10;
20         sum=sum+rem*power_fn(2,exp);
21         exp++;
22         binary=binary/10;
23     }
24     int array[100],i=0,j;
25     while(sum!=0)
26     {
27         array[i++]=sum%8;
28         sum=sum/8;
29     }
30     for(j=i-1;j>=0;j--)
31     cout<<array[j];
32 }
```

**“HARD WORK BEATS
TALENT WHEN TALENT
DOESN'T WORK HARD”**
-TIM NOTKE