

MARINHA DO BRASIL

SERVIÇO DE SELEÇÃO DO PESSOAL DA MARINHA



**Concurso Público de Admissão ao Colégio Naval
CPACN/2022**

**NÃO ESTÁ AUTORIZADA A UTILIZAÇÃO DE
MATERIAL EXTRA**

1º Dia – Prova de Matemática e Inglês

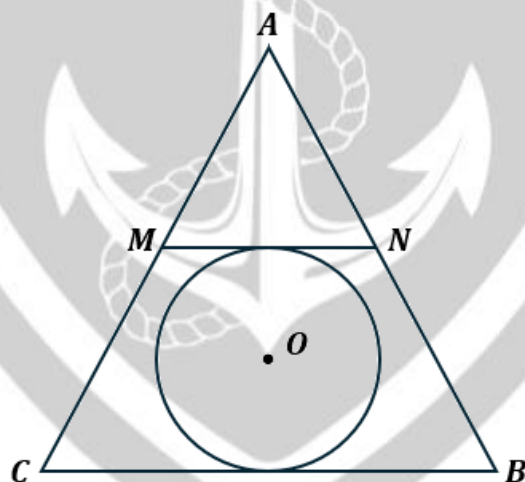
Questão 1

Em estatística, a variância e desvio padrão são medidas que indicam o quanto os valores de um conjunto de dados numéricos estão próximos ou distantes da média aritmética desses valores. Quanto mais homogêneos forem os valores desse grupo em relação à média, menor será a variância e o desvio padrão. Matematicamente, o desvio padrão é a raiz quadrada da variância. Feita uma pesquisa relativa ao tempo de mar dos tripulantes de uma Fragata da Marinha do Brasil, encontrou-se a variância de 0,444.... Assim, o desvio padrão dos dados é igual a:

- (A) 0,222...
- (B) 0,333...
- (C) 0,444...
- (D) 0,666...
- (E) 0,888...

Questão 2

O símbolo do Grêmio Estudantil do Colégio Naval é composto por um círculo de raio $= k\sqrt{3}$, centro O , tangente ao lado $\overline{BC}$ e ao segmento $\overline{MN}$ ($\overline{MN} \parallel \overline{BC}$) do triângulo equilátero ABC , cujo lado mede 6 cm, conforme figura abaixo.



Determine o valor de k para que a soma das áreas do triângulo AMN e do círculo seja mínima, em cm. Utilize $\pi = 3$.

- (A) $4\sqrt{3}/(9 + 4\sqrt{3})$
- (B) $9\sqrt{3}/(18 + 8\sqrt{3})$
- (C) $5\sqrt{3}/(9 + 4\sqrt{3})$
- (D) $11\sqrt{3}/(18 + 8\sqrt{3})$
- (E) $6\sqrt{3}/(9 + 4\sqrt{3})$

Questão 3

O número natural X possui as seguintes características: ao ser dividido por 7 deixa resto 4 e ao ser dividido por 17 deixa resto 5. Assim, qual é o resto da divisão de X por 119?

- (A) 6
- (B) 20
- (C) 39
- (D) 68
- (E) 103

Questão 4

O relógio analógico de um camarote da Fragata Liberal foi acertado exatamente às 18 horas. Qual será o menor ângulo entre os ponteiros desse relógio, quando o ponteiro menor tiver percorrido um ângulo de 36° ?

- (A) 72°
- (B) 90°
- (C) 108°
- (D) 126°
- (E) 144°

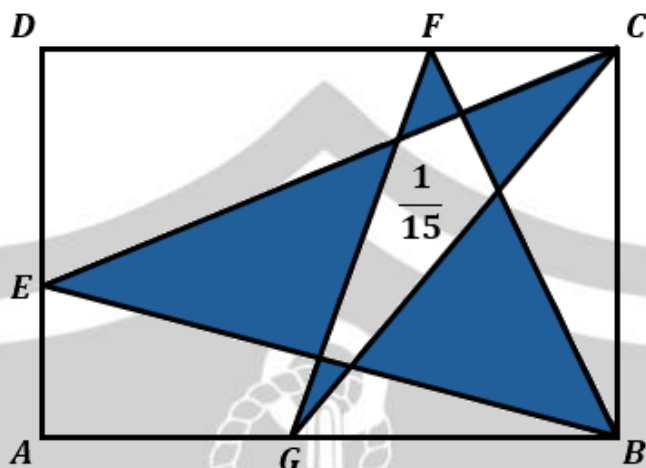
Questão 5

Sejam as funções f e g definidas por $f(x) = x^6 - 2x^5 - x^4 + 10x^3 - 16x^2 - 8x + 16$ e $g(x) = x^3 - x^2 - 4x + 4$. A soma dos valores inteiros que satisfazem a desigualdade $0 \leq \frac{f(x)}{g(x)} \leq 4$ é igual a:

- (A) - 2
- (B) -1
- (C) 0
- (D) 1
- (E) 2

Questão 6

Seja o quadrado $ABCD$ de área igual a 1 unidade de área (1 $u.a.$), e os pontos E , F e G sobre os lados $\overline{AD}$, $\overline{DC}$ e $\overline{AB}$, respectivamente, conforme figura abaixo.



Considere a área do pentágono interior igual a $\frac{1}{15}$. O valor da área hachurada, em $u.a.$, é igual a:

- (A) $\frac{11}{30}$
- (B) $\frac{13}{30}$
- (C) $\frac{7}{15}$
- (D) $\frac{1}{2}$
- (E) $\frac{8}{15}$

Questão 7

Um atleta da Marinha do Brasil possui capacidade física para correr até 4 horas continuamente ou caminhar até 32 horas continuamente. Ao testar seus limites, em um determinado dia, ele correu 3 horas e, logo em seguida, caminhou x horas até atingir o máximo de sua capacidade física. Assinale a opção que indica o valor de x , em horas.

- (A) 6
- (B) 8
- (C) 11
- (D) 17
- (E) 20

Questão 8

Seja o número natural N , com $N > 8$. Ao dividirmos N por 9, por 12 e por 15 obtemos sempre resto 8. A soma dos algarismos do menor número N possível é igual a:

- (A) 9
- (B) 11
- (C) 13
- (D) 15
- (E) 17

Questão 9

No período de comemorações alusivas ao 70º aniversário do Colégio Naval, foi realizada uma olimpíada de matemática e uma das questões era:

Considere $k = 1 + 2 + 3 + \dots + 68 + 69 + 70$. Calcule a soma $S = 1 + (1+2) + (1 + 2 + 3) + \dots + (1 + 2 + 3 + \dots + 68 + 69 + 70)$ em função de k .

Marque a opção que indica a resposta correta da questão apresentada na olimpíada.

- (A) $69k - 1$
- (B) $69k$
- (C) $69k + 1$
- (D) $70k$
- (E) $70k + 1$

Questão 10

Um investidor aplicou R\$ 1.000,00 em um investimento que rende juros de 20% ao mês. Após um mês, ele resgatou metade do dinheiro deixando o restante nesse investimento. Ao final do 2º mês, ele adicionou ao investimento, o valor equivalente a 30% da quantia que ele havia retirado no mês anterior. Ao final do 3º mês, ele resgatou todo o dinheiro aplicado. Assinale a opção que indica quanto ele lucrou ao total, após esses 3 meses de investimento.

- (A) R\$ 80,00
- (B) R\$ 180,00
- (C) R\$ 500,00
- (D) R\$ 680,00
- (E) R\$ 780,00

Questão 11

Em uma pesquisa sobre prática de esportes realizada com alunos do Colégio Naval constatou-se que: 116 alunos praticam Esgrima ou latismo; 59 alunos praticam Esgrima ou Xadrez; e 58 alunos praticam latismo ou Xadrez. Dentre os praticantes de esporte, quantos praticam somente Xadrez?

- (A) 0
- (B) 1
- (C) 2
- (D) 3
- (E) 4

Questão 12

Na organização de uma competição interna do Colégio Naval, ficou decidido que cada ano de escolaridade compraria suas bolas de treinamento. Essa compra ocorreu da seguinte forma:

	QUANTIDADE DE BOLAS DE FUTEBOL	QUANTIDADE DE BOLAS DE BASQUETE	QUANTIDADE DE BOLAS DE VÔLEI
1º ANO	4	2	2
2º ANO	6	8	3
3º ANO	2	3	1

Sabendo que as bolas de mesma categoria têm o mesmo valor, o total gasto pelo 1º ano foi de R\$ 1.800,00 e que o total de gasto do 2º ano foi de R\$ 3.000,00, podemos afirmar que:

- (A) é possível calcular o total gasto pelo 3º ano, mas nenhum dos preços unitários das três bolas.
- (B) não é possível calcular o preço de qualquer uma das bolas.
- (C) é possível calcular o total gasto pelo 3º ano e os preços unitários das três bolas.
- (D) é possível calcular o total gasto pelo 3º ano e apenas o preço unitário da bola de basquete.
- (E) não é possível calcular o total gasto pelo 3º ano.

Questão 13

Sejam x e y números inteiros positivos tais que $0 < x \leq 6$ e $x + y = 18$. O maior valor do produto $x \cdot y$ é igual a:

- (A) 72
- (B) 77
- (C) 80
- (D) 81
- (E) 90

Questão 14

Observe o símbolo abaixo.



O pentágono do símbolo da Fragata Rademaker é regular. Se o produto da medida de uma de suas diagonais pela medida de um de seus lados é 2 dm^2 , determine a medida desse lado, em dm, e assinale a opção correta.

- (A) $\sqrt{\sqrt{5} - 1}$
- (B) $\sqrt{\sqrt{5} + 1}$
- (C) $\sqrt{5} - 1$
- (D) $\sqrt{5}$
- (E) $\sqrt{5} + 1$

Questão 15

O número de dias de mar do Marinheiro Flávio é um número de três algarismos (ABC), todos diferentes de zero, o algarismo das dezenas é igual à soma entre o algarismo das unidades e das centenas. O número de dias de mar do Marinheiro Geraldo (CBA) é obtido invertendo as ordens numéricas do número de dias de mar de Flávio. Quantos quadrados perfeitos são possíveis obter com a soma dos dias de mar de Flávio e Geraldo?

- (A) 2
- (B) 3
- (C) 4
- (D) 5
- (E) 6

Questão 16

Os Capitães Mauriê, Jamerson, Jerônimo e Elvis, foram designados para comandar as Fragatas Rademaker, Liberal, Constituição e União. Considere:

- I - O Capitão Mauriê, pelo critério da antiguidade, escolheu a Fragata Rademaker para comandar.
- II - Cada Fragata tem apenas um comandante.
- III - C é o conjunto dos Capitães e F o conjunto das Fragatas.
- IV - A relação entre cada Comandante e sua Fragata.

Quantas são as possíveis funções de C em F?

- (A) 2
- (B) 3
- (C) 4
- (D) 5
- (E) 6

Questão 17

O valor cobrado, em uma loja de uniformes, por uma plaqueta de identificação sofreu um aumento de $x\%$, onde x é um número natural entre 10 e 100. Devido às quedas nas vendas, a loja resolveu voltar a cobrar o preço anterior. Qual deve ser o percentual de desconto, sobre o valor acrescido, que essa loja deve aplicar para voltar ao preço anterior?

- (A) $x\%$
- (B) $(1 / 1,x)\%$
- (C) $[(1,x-1) / 1,x]\%$
- (D) $[(2-1,x) / 1,x]\%$
- (E) $1,x\%$

Questão 18

Um Hotel de trânsito da Marinha do Brasil possui n quartos enfileirados. O administrador do hotel vai numerar as portas dos quartos de forma crescente com algarismos metálicos, mas percebe que só possui os algarismos 0, 1 e 2, de forma suficiente para numerar todos os quartos. Dessa forma, a numeração dos quartos seguiu o seguinte padrão mostrado na tabela abaixo.

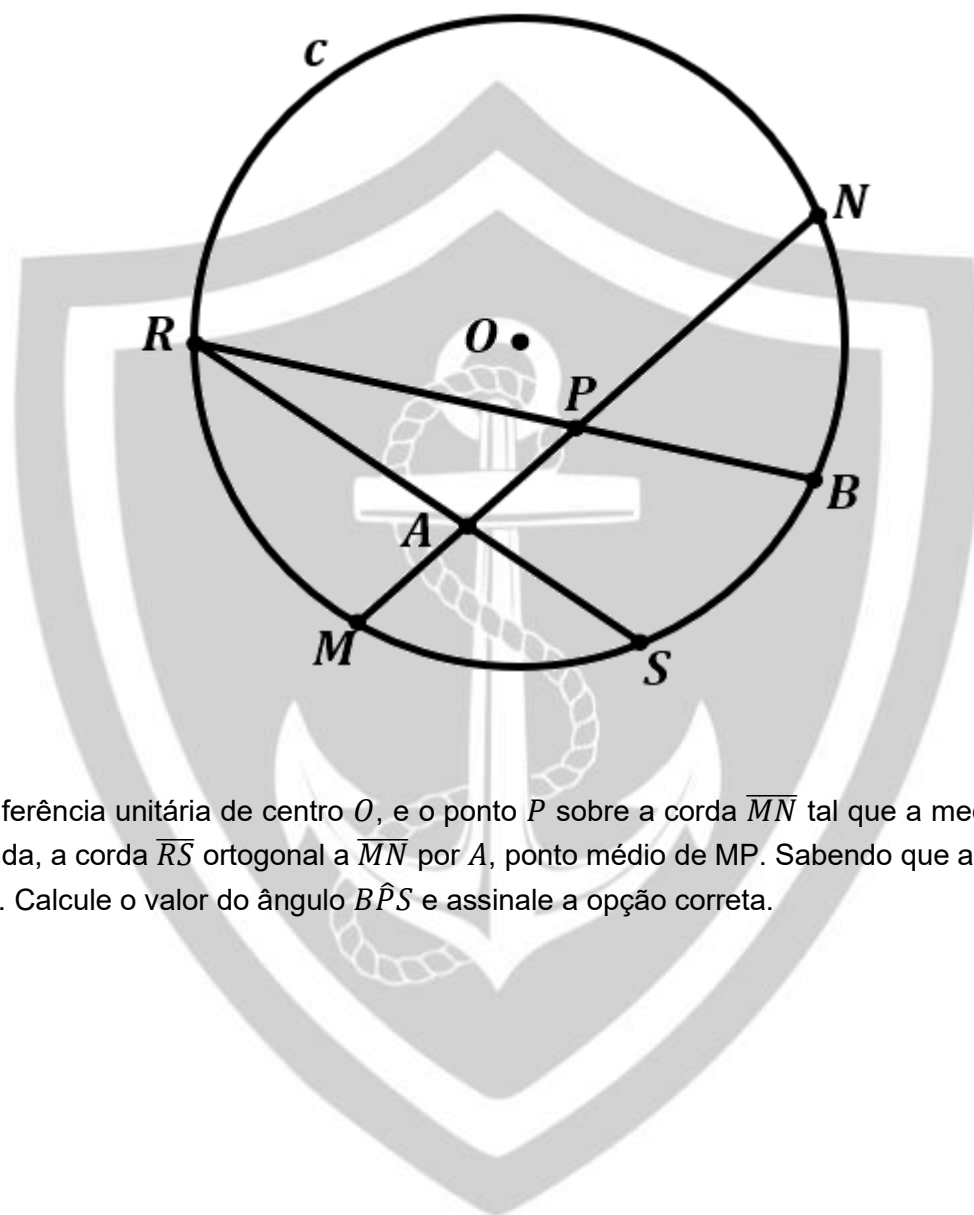
Quarto	Número na porta
1º	1
2º	2
3º	10
4º	11
5º	12
6º	20
7º	21
...	...

De acordo com os dados, qual é a posição (ordem) do quarto numerado por 1210022?

- (A) 143º
- (B) 1024º
- (C) 1057º
- (D) 1210º
- (E) 1304º

Questão 19

Observe a figura abaixo.



Sejam c a circunferência unitária de centro O , e o ponto P sobre a corda $\overline{MN}$ tal que a medida de $\overline{NP}$ é igual ao raio. Seja, ainda, a corda $\overline{RS}$ ortogonal a $\overline{MN}$ por A , ponto médio de MP . Sabendo que as cordas $\overline{BR}$ e $\overline{MN}$ concorrem em P . Calcule o valor do ângulo $\widehat{BPS}$ e assinale a opção correta.

- (A) 15°
- (B) $22,5^\circ$
- (C) 30°
- (D) 45°
- (E) 60°

Questão 20

Observe o símbolo abaixo.



Associamos a cada vértice do símbolo da Corveta Caboclo as Letras A , B , C , D , e E , conforme a figura acima. Fazendo a associação $A - 1$, $B - 2$, $C - 3$, $D - 4$, $E - 5$, $A - 6$, ..., e assim, sucessivamente, a qual vértice estará associado o número 2022?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

Read text I to answer questions 21 to 24.

TEXT I

Everything to Know About the Beijing Winter Olympics Opening Ceremony

The Beijing 2022 Winter Olympics opening ceremony took place on Feb. 4 in a world that has changed dramatically since the last time the Chinese capital held the Olympic Games.

The 2008 Beijing Summer Olympics marked China's "coming out" as a global superpower. One third of the world tuned in to the \$100 million event. Some 15,000 performers participated in a production that showcased the best of Chinese history and culture. An estimated 91,000 people, including U.S. President George W. Bush and other world leaders, attended the event, which Steven Spielberg had called the "grandest spectacle of the new millennium."

Here's what you need to know about the 2022 Winter Olympics Opening Ceremony.

When is the 2022 Beijing Olympics Opening Ceremony?

The opening ceremony for the 2022 Winter Games is on Feb. 4. The Beijing Olympics' formal opening began at 7:30 pm. China Standard Time or 6:30 a.m. ET and 3:30 a.m. PT.

What happened at the Beijing Olympics Opening Ceremony?

Beijing's organizing committee assured a "simple, safe and splendid staging of the Winter Games during the COVID-19 pandemic, and the opening ceremony will reflect that theme.

Internationally acclaimed filmmaker Zhang Yimou, who directed the spectacular launch of the 2008 Summer Olympics, returned for the 2022 Beijing Winter Olympics opening ceremony. He promised a "different and unique" opening this time around in an interview with state-run news outlet Xinhua: "China's status in the world, the image of the Chinese and the rise of our national status - everything is totally different now." With a runtime of 1 hour and 40 minutes and some 3,000 performers joining, the ceremony was scaled down from 2008's extravaganza due to cold weather and the pandemic. It was still held at the National Stadium, dubbed the "Bird's Nest, and Zhang promised an "innovative" cauldron-lighting that will echo China's thrust towards environmental protection.

Who is attending the Winter Olympics this year?

Some 2,900 athletes from over 90 countries are attending the Winter Games in China, close to figures of participating athletes in Sochi, Russia in 2014 and Pyeongchang, South Korea in 2018.

How will China minimize COVID-19 infections during the Winter Olympics?

The Zero COVID policy is the cornerstone of the Beijing Olympics anti-epidemic playbook published last December. China will manage athletes and other inbound participants under a "closed-loop system. Athletes, coaches and the media will only be allowed to visit designated Olympics venues using special transportation that is separate from Beijing's 21.5 million people. The three zones of Beijing, Yanqing, and Zhangjiakou will have their own closed loop systems barring those inside from having any contact with the wider Chinese population. To transfer from one closed loop system to another, they must take designated trains, or travel on assigned buses which will ply specific routes.

Adapted from: <http://time.com/6141429/belling-winter-olympics-opening-ceremony-2022/>

Questão 21

According to the text:

- (A) the 2022 opening ceremony was smaller than 2008's.
- (B) in 2008, China hosted the Winter Olympic Games in Beijing.
- (C) the ceremony was bigger than 2008's with a great audience.
- (D) athletes and coaches are free to go anywhere during the event.
- (E) there isn't any measure to minimize COVID-19 infections.

Questão 22

Read the following sentence taken from the text.

The 2008 Beijing Summer Olympics marked China's "coming out" as a global superpower."
What can we infer?

- (A) Summer Olympics in 2008 was a total disaster.
- (B) China became the most powerful country.
- (C) The 2008 Summer Olympics was a success.
- (D) The ceremony in 2008 was simple and safe.
- (E) The event was scaled down from the last one.

Questão 23

Read the following sentence:

(...) they must take designated trains, or travel on assigned buses which will ply specific routes."

What's the idea expressed by must in the sentence?

- (A) Permission.
- (B) Possibility
- (C) Obligation.
- (D) Probability.
- (E) Suggestion.

Questão 24

Say if the following statements are T (true) or F (false). Then, mark the correct option.

- () 15,000 athletes attended The 2008 Beijing Summer Olympics.
- () Zhang Yimou directed two Olympics opening ceremony in Beijing.
- () George W. Bush attended the 2022 Beijing Olympics Opening Ceremony.
- () The 2022 Opening Ceremony took place at the same stadium as in 2008.

- (A) (T) (F) (T) (F)
- (B) (F) (T) (F) (T)
- (C) (F) (F) (T) (F)
- (D) (T) (T) (F) (T)
- (E) (F) (T) (T) (T)

Read text II to answer questions 25 to 27.

TEXT II

The Positive and Negative Effects of Technology on Your Life

As a society, we've come a long way with the help of technology. But is it all rainbows and sunshine? Technology is around us everywhere, from simple devices like our smartphones, laptop, and TV to background tech that we don't even notice. Once we get the hang of using tech the right way, it can improve our lives and make our lives better. On the other hand, tech can also make our lives harder. Whether technology has a positive or negative effect on our lives, it all depends on how we use it. So, let's look at some of the positive and negative aspects of technology in our lives, shall we?

Positives of Technology in Our Lives

1. Technology Boosts Business

Many new tech advancements and innovations are made by and for businesses. Why? Because companies are always looking to upgrade their products and services for profit. The purpose is to boost business and make the daily management of enterprises more systematic, structured, and successful.

2. Technology Makes Shopping Online Possible

Advancements in tech have made it easier and cheaper for more people to access the internet. Currently, most people prefer to shop online without leaving the house because of its sheer convenience.

3. Technology Has Advanced Education

One of the most downplayed areas of technology that has dramatically improved over the past few years is education. A few examples include the availability of online courses, accessibility of web seminars, and unlimited online resources for research. Before tech, you'd have to physically go to class, attend a meeting or go to the library to do research. Now, education is easier for everyone, no matter where you live.

4. Technology Makes Everyday Life Better

Tech has made an immensely positive impact on the daily lives of everyday people. Some positive examples include improvements in the transportation system and household items.

Negatives of Technology in Our Lives

1. Technology Causes Health Problems

Apart from creating unhealthy sleeping patterns, electronic devices can cause digital eye strain, poor posture, and increased inactivity, leading to health problems like obesity.

2. Technology Creates Job Insecurity

Job loss and downsizing are two significant adverse effects of technology. Because of advances in the tech field such as AI integration, automating and accomplishing tasks have become easy.

3. Tech Products Lack Longevity

Technology grows incredibly quickly, so the digital devices and gadgets that we use have a short lifespan and become outdated in a matter of months. These pieces of tech can be pushed aside by newer.

4. Technology Spawns Misinformation and Fake News The spread of misinformation and fake news online is nothing new. However, with all the developments that happen so frequently in technology, it has become harder to define what's true and what's not.

Adapted from: <https://www.makeuseof.com/effects-of-technology-on-life/>

Questão 25

According to the text, it is correct to state that:

- (A) technology has, without a doubt, made all our lives worse over the past two decades.
- (B) as technology advances, we are connected now more than ever and it doesn't impact our physical health.
- (C) some devices are so important in our daily lives that we don't need a more advanced version.
- (D) machines can now carry out tasks that only humans could do so far, which improves job opportunities.
- (E) because of technology advancements, many people cannot tell what information is factual and what isn't.

Questão 26

"(...), it all depends on how we use it". What does the underlined word in the text refer to?

- (A) Whether.
- (B) Technology.
- (C) Lives.
- (D) Effect.
- (E) Aspects.

Questão 27

Based on the text, mark the alternative that does NOT indicate a positive effect of technology.

- (A) Online classes have made it possible for all students to enroll without leaving their homes.
- (B) Technology has not boosted businesses by improving the products and error-free collection.
- (C) A few of the benefits of online shopping include cheaper products, saved time, fuel, and energy.
- (D) Technology has also had a positive influence on household devices and transportation system.
- (E) Once we get accustomed to using technology properly, it has a positive influence in our lives.

Read text III to do questions 28 and 29.

TEXT III

Who Is Kamala Harris?

Kamala Harris is the vice president of the United States, making her the first female vice president and first Black person and Asian American to hold the position. After attending Howard University and the University of California's Hastings College of the Law, Kamala Harris embarked on a rise through the California legal system, emerging as state attorney general in 2010. Following the November 2016 elections, Harris became just the second African American woman and the first South Asian American to win a seat in the U.S. Senate. She declared her candidacy for the 2020 U.S. presidential election on Martin Luther King Jr. Day 2019 but dropped out of the race before the end of the year. In August 2020, Joe Biden announced Harris as vice presidential running mate and after a close race, Biden and Harris were elected in November 2020.

Adapted from: <https://www.biography.com/political-figure/kamala-harris>

Questão 28

According to the text:

- (A) she graduated in law from Oxford College.
- (B) she is the first woman vice president of the US.
- (C) she was a presidential candidate in 2016.
- (D) she was elected vice president in 2010.
- (E) she became the first woman in the U.S. Senate.

Questão 29

"(...) Joe Biden announced Harris as vice presidential running mate".

It is possible to rewrite the sentences substituting the underlined parts for:

- (A) him/her
- (B) he/she
- (C) she/him
- (D) he/her
- (E) she/he

Questão 30

Mark the sentence which is grammatically correct.

- (A) Luke and I clean the house every weekend.
- (B) Everybody enjoyed very much the party.
- (C) We have always to wait a long time for the bus.
- (D) My parents both are mathematics teachers.
- (E) They're going on Saturday to South Africa.

Questão 31

Mark the option that ONLY contains uncountable nouns.

- (A) Advice / Children / Behavior
- (B) Luggage / Traffic / Umbrella
- (C) Information / Luck / Bread
- (D) Furniture / Weather / Job
- (E) Baggage / Suggestion / Chaos

Questão 32

Which one is the ONLY correct sentence?

- (A) Mark's and Kate's house is so clean.
- (B) My friends' boss is so rude. He hates him.
- (C) Women' clothes are too much expensive.
- (D) John and Mary's wedding were on Sunday.
- (E) Tomorrow's meeting will start at 10 o'clock.

Questão 33

Read the sentence below.

"A riot occurred in my neighborhood yesterday."

Mark the option which rewrites the sentence using there to be.

- (A) There is a riot in my neighborhood.
- (B) There was a riot in my neighborhood.
- (C) There has been a riot in my neighborhood.
- (D) There will be a riot in my neighborhood.
- (E) There were a riot in my neighborhood.

Questão 34

Mark the sentence which is grammatically INCORRECT.

- (A) Do you usually work out in the morning?
- (B) She got married on 23 July 2016.
- (C) Will you go out on next Saturday?
- (D) Don't worry! I'll be here at the weekend.
- (E) They went on vacation in October.

Questão 35

Choose the correct option.

- (A) Margaret isn't very popular. She has little friends.
- (B) My husband is very busy today. He has few free time.
- (C) The bus was very crowded. There were too much people.
- (D) They don't spend many money in expensive clothes.
- (E) Anne is so worried. She has many problems to solve.

Questão 36

Suzy: Have you ever _____ to New York?

Jane: No, I _____ been there. Why?

Suzy: I'm planning a trip and I'd like some tips about what kind of clothes to take.

Jane: Oh really? My friend Josh _____ there for a year. I think he can _____ you.

Suzy: That's amazing.

Choose the best option to complete the dialogue.

- (A) been / have never / has lived / help
- (B) been / never have / have lived / help
- (C) be / have never / has lived / helping
- (D) be / haven't never / have lived / helps
- (E) been / haven't never / has lived / helps

Questão 37

Read the comic strip below.



<https://www.gocomics.com/calvin>

Mark the right option to fill in the blank in the cartoon.

- (A) more disgusting than
- (B) as disgusting than
- (C) the most disgusting than
- (D) the least disgusting than
- (E) disgusting than

Questão 38

Mark the sentence which is grammatically correct.

- (A) Atlantic Ocean is the second largest ocean in the world.
- (B) I've visited the Mexico and the United States recently.
- (C) I know that the Amazon is a large forest in north of Brazil.
- (D) I went to London and visited the British Museum last year.
- (E) England used to be part of United Kingdom for centuries.

Questão 39

Read the sentence below.

"Last Wednesday we saw Doctor Hill at the bus stop."

Mark the option that indicates the correct question for the sentence above.

- (A) When was the last time you went to work by bus?
- (B) Who do they see at the bus stop on Wednesdays?
- (C) How long does it take to get to work in the morning?
- (D) Which doctor did you see Doctor John or Doctor Hill?
- (E) Why does Doctor Hill go to work during the week?

Questão 40

Mark the option that best complete the blanks.

The Marines _____ more of the ships they've got and more ships yet to be designed, all in an effort to _____ in the maritime fight. Top Marine leaders, Commandant Gen. David Berger and Gen. David Odom, recently pushed the ship needs of the Corps. The America-class ship has been in service since 2014 and _____ Marines a vertical lift platform at range in various areas.

Adapted from: <https://www.militarytimes.com/news/your-marine-corps/2022/02/14/new-warship-no-tradeoff-but-wanted-for-future-marine-fight/>

- (A) wants / stay / has given
- (B) want / stays / gives
- (C) wants / stayed / give
- (D) want / stay / gives
- (E) wanted / stays / give

Gabarito

Matemática

- 1- D
- 2- E
- 3- C
- 4- E
- 5- B
- 6- A
- 7- B
- 8- E
- 9- Anulada
- 10- C
- 11- A
- 12- D
- 13- A
- 14- A
- 15- A
- 16- E
- 17- Anulada
- 18- E
- 19- E
- 20- B

Inglês

- 21- A
- 22- C
- 23- C
- 24- B
- 25- E
- 26- B
- 27- B
- 28- B
- 29- D
- 30- A
- 31- C
- 32- E
- 33- B
- 34- C
- 35- E
- 36- A
- 37- A
- 38- D
- 39- D
- 40- D