MARINHA DO BRASIL

DIRETORIA DE ENSINO DA MARINHA

Concurso Público de Admissão ao Colégio Naval
CPACN/2017

NÃO ESTÁ AUTORIZADA A UTILIZAÇÃO DE MATERIAL EXTRA

1ª Fase – Prova de Matemática e Inglês

QUESTÃO 1

Dois aumentos consecutivos de $i\%$ e $2i\%$ correspondem a um aumento percentual igual a

(A) $\left(i+i^2\right)\%$

(B) $\left(3i+\dfrac{i^2}{50}\right)\%$

(C) $\left(2i\right)^2\%$

(D) $\left(3i+\dfrac{2i}{100}\right)\%$

(E) $\left(3i\right)\%$

QUESTÃO 2

Sobre o sistema $\begin{cases} \sqrt[5]{y} \;+\; x^{-3} \;=\; \dfrac{3}{5} \\ y^{2/5} \;-\; \left(x^{-2}\right)^3 \;=\; \dfrac{4}{25} \end{cases}$ pode-se afirmar que o valor de

(A) y^2 é $\dfrac{169}{900}$.

(B) x^4 é $\dfrac{13}{30}$.

(C) x é $\sqrt[3]{3}$.

(D) y é zero.

(E) x^3 é 6.

QUESTÃO 3
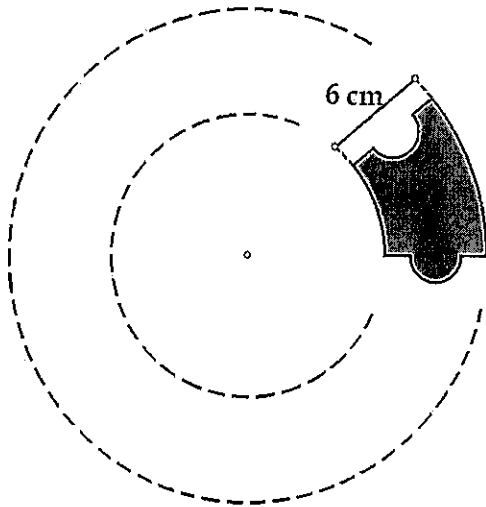
Analise a figura a seguir.
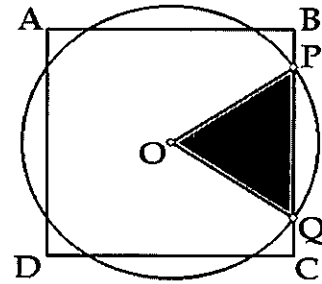
Pelo centro O do quadrado de lado $\sqrt{6}$ cm acima, traçou-se a circunferência que corta o lado BC nos pontos P e Q. O triângulo OPQ tem área $\dfrac{\sqrt{3}}{2}$ cm². Sendo assim, é correto afirmar que o raio dessa circunferência, em cm, é igual a

(A) 1

(B) $\sqrt{2}$

(C) $\sqrt{3}$

(D) $\dfrac{2\sqrt{2}}{3}$

(E) $\dfrac{\sqrt{3}}{2}$

QUESTÃO 4

Observe a figura a seguir.

A figura acima exibe um total de n peças idênticas de um quebra cabeça que, resolvido, revela uma coroa circular. Sabe-se que 6 cm é a menor distância entre as circunferências concêntricas pontilhadas da figura e que o raio da menor dessas circunferências é igual a 9cm. Se a área de cada peça é (12π)cm², é correto afirmar que n é igual a

(A) 6
(B) 8
(C) 9
(D) 12
(E) 15

QUESTÃO 5
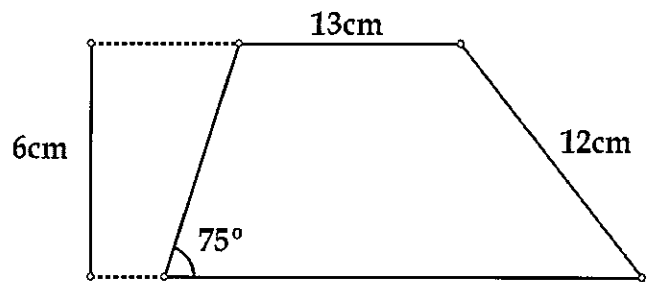
Se $\sqrt{2} = 1 + \cfrac{1}{2 + \cfrac{1}{2+x}}$, é correto afirmar que o valor de x

está no intervalo

(A) 0,1 < x < 0,2
(B) 0,2 < x < 0,3
(C) 0,3 < x < 0,4
(D) 0,4 < x < 0,5
(E) 0,5 < x < 0,6

QUESTÃO 6

Observe a figura a seguir.

A figura acima representa o trapézio escaleno de altura 6cm, com base menor medindo 13cm, um dos ângulos internos da base maior medindo 75° e lado transversal oposto a esse ângulo igual a 12cm. Qual é a área, em cm², desse trapézio?
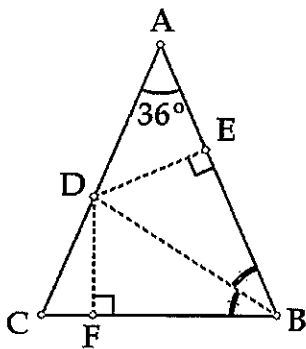
(A) 120
(B) 118
(C) 116
(D) 114
(E) 112

QUESTÃO 7

O produto das idades de quatro irmãos é 180. Além disso, todos os irmãos têm idades diferentes. Se o mais velho tem menos de 12 anos, é correto afirmar que a maior soma possível dessas quatro idades é igual a

(A) 16
(B) 19
(C) 20
(D) 22
(E) 25

QUESTÃO 8

Observe a figura a seguir.

A figura a acima mostra um triângulo isósceles ABC, com $B\hat{A}C = 36°$ e $AB = AC = 1m$. A bissetriz interna de B corta AC em D. Por D, traçam-se as distâncias até AB e até BC, determinando os pontos E e F, respectivamente. Sendo assim, é correto afirmar que o valor do produto $\dfrac{DE}{AD} \cdot \dfrac{DF}{BF}$ é

(A) $\dfrac{\sqrt{5}-1}{4}$

(B) $\dfrac{3\sqrt{5}-5}{4}$

(C) $\dfrac{3-\sqrt{5}}{2}$

(D) $\dfrac{3\sqrt{5}-1}{2}$

(E) $\dfrac{4-\sqrt{5}}{2}$

QUESTÃO 9

Sejam a, b e c números reais tais que $a^2 + b^2 + c^2 - 4a + 2b - 2c + 6 = 0$. Sobre a, b e c são feitas as seguintes afirmações:

I- $a^b < b^a$.

II- $c^{b^a} = 1$.

III- $b^{(-a)} = (-c)^b$.

IV- $a > b > c$.

Sendo assim, é correto afirmar que a quantidade de afirmativas verdadeiras é

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

QUESTÃO 10

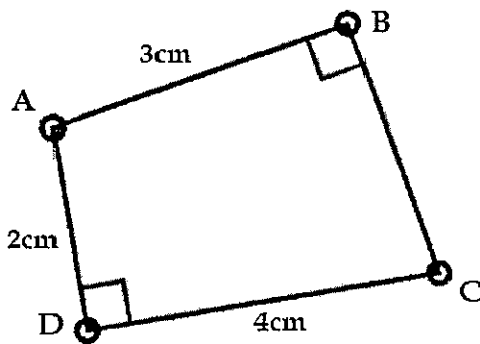Considere um losango ABCD de lado igual a 5cm, diagonais AC e BD, e ângulo interno BÂD = 120°. Sabe-se que um ponto M sobre o lado AB está a 2cm de A enquanto um ponto N sobre o lado BC está a 3cm de C. Sendo assim, a razão entre a área do losango ABCD e a área do triângulo de vértices MBN é igual a

(A) $\dfrac{15}{2}$

(B) $\dfrac{21}{4}$

(C) $\dfrac{25}{3}$

(D) $\dfrac{32}{5}$

(E) $\dfrac{49}{4}$

QUESTÃO 11

Observe a figura a seguir.

A figura acima apresenta o quadrilátero ABCD, com ângulos retos internos nos vértices B e D, AB = 3cm, AD = 2cm e CD = 2AD. Nessas condições, pode-se afirmar que

(A) AC < BD e AC + BD < 10 cm
(B) AC > BD e AC + BD < 10 cm
(C) AC = BD e AC + BD < 10 cm
(D) AC > BD e AC + BD < 6 cm
(E) AC < BD e AC + BD < 6 cm

QUESTÃO 12

O número h tem 241 algarismos e $h = (z \cdot w)^x$. O MDC (x,25), com x natural, resolvido pelo algoritmo das divisões sucessivas de Euclides, gera o esquema a seguir:

	y	1	4	←quocientes
x	25	z	w	←Dividendos e divisores
z	w	0		← restos

Sendo assim, é correto afirmar que a soma x + y + z + w é igual a

(A) 274
(B) 224
(C) 199
(D) 149
(E) 99

QUESTÃO 13

Considere # o operador matemático que associa a raiz quadrada do menor quadrado perfeito maior que a soma das parcelas envolvidas, isto é, $3\#8 = \sqrt{16} = 4$ porque o menor quadrado perfeito maior que a soma (3+8=11) é 16 e sua raiz quadrada é 4. Assim, se $x = \left\{5\#\left[6\#(7\#8)\right]\right\}^{2\#11}$ e $y = \left\{\left[(5\#6)\#7\right]\#8\right\}^{3\#5}$, é correto afirmar que o valor de $x\#y$ é

(A) 11
(B) 12
(C) 13
(D) 14
(E) 15

QUESTÃO 14

Sejam os conjuntos A = {9, 27, 45,..., 423, 441}, B = {18, 36, 54,..., 432, 450}, C = {3, 9, 15,..., 141, 147} e D = {6, 12, 18, ..., 144, 150}. Define-se P_K como sendo o produto de todos os elementos do conjunto K. Nas condições apresentadas, é correto afirmar que a expressão $\dfrac{P_A \cdot P_B}{P_C \cdot P_D} \cdot 243^{-10}$ é igual a

(A) 1000
(B) 500
(C) 100
(D) 10
(E) 1

QUESTÃO 15

Os números x e y pertencem ao conjunto C = {17,20,23,26,...,2018} e são tais que x > y. Sendo assim, pode-se concluir que $2017 \cdot 2^x + 8^y$, na divisão por 7, deixa resto

(A) 0
(B) 1
(C) 3
(D) 4
(E) 5

QUESTÃO 16

Seja "x" real tal que $\dfrac{3}{x+1}+\dfrac{4}{1-x}=\dfrac{1}{x}$. Sendo assim, o valor de $\left(\dfrac{1}{x^2}-\dfrac{7}{x}\right)$ é igual a

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

QUESTÃO 17

Analise as afirmativas a seguir.

I- Sejam a, b e c os lados de um triângulo, com $c > b \geq a$. Pode-se afirmar que $c^2 = a^2 + b^2$ se, e somente se, o triângulo for retângulo.
II- Se um triângulo é retângulo, então as bissetrizes internas dos ângulos agudos formam entre si um ângulo de 45° ou 135°.
III- O centro de um círculo circunscrito a um triângulo retângulo está sobre um dos catetos.
IV- O baricentro de um triângulo retângulo é equidistante dos lados do triângulo.

Assinale a opção correta.

(A) Somente I e II são verdadeiras.
(B) Somente II e III são verdadeiras.
(C) Somente I e IV são verdadeiras.
(D) Somente I, II e IV são verdadeiras.
(E) As afirmativas I, II, III e IV são verdadeiras.

QUESTÃO 18

Um triângulo isósceles ABC tem base BC = 16 cm e lados congruentes AB = AC = 17 cm. O raio do círculo inscrito ao triângulo ABC em cm é igual a:

(A) $\dfrac{32}{15}$

(B) $\dfrac{24}{5}$

(C) $\dfrac{35}{8}$

(D) $\dfrac{28}{5}$

(E) $\dfrac{17}{4}$

QUESTÃO 19

Seja o número real x tal que $W = \dfrac{2x^2}{9} - \dfrac{\sqrt{6}}{6}x + 21$.

Sendo assim, qual o valor de x para que W seja mínimo?

(A) $3\sqrt{6}$

(B) $\dfrac{3\sqrt{6}}{8}$

(C) $7\sqrt{9}$

(D) $\dfrac{2\sqrt{6}}{3}$

(E) $6\sqrt{6}$

QUESTÃO 20

Sabendo que $5^k = 561 + 2^{2p}$ e $5^{\frac{k}{2}} = 17 + 2^p$, o valor de $\frac{p^k - k^p}{p^k + k^p}$ é igual a

(A) $\frac{7}{11}$

(B) $\frac{19}{35}$

(C) $\frac{17}{145}$

(D) $\frac{11}{127}$

(E) $\frac{13}{368}$

Read text I in order to answer items 21 to 25.

Helping at a hospital

Every year many young people finish school and then take a year off before they start work or go to college. Some of them go to other countries and work as volunteers. Volunteers give their time to help people. For example, they work in schools or hospitals, or they help with conservation.

Mike Coleman is 19 and _____ in Omaha, Nebraska, in the United States. He wants to become a teacher but now he _____ in Namibia. He's working in a hospital near Katima Mulilo. He says, "I'm working with the doctors and nurses here to help sick people. I'm not a doctor but I can do a lot of things to help. For example, I help carry people who can't walk. Sometimes I go to villages in the mobile hospital, too. There aren't many doctors here so they need help from people like me. I don't get any money, but that's OK, I'm not here for the money."

"I'm staying here for two months, and I'm living in a small house with five other volunteers. The work is hard and the days are long, but I'm enjoying my life here. I'm learning a lot about life in Southern Africa and about myself! When I finish the two months' work, I want to travel in and around Namibia for three weeks. For example, I want to see the animals in the Okavango Delta in Botswana."

http:// vyre-legacy-access.cambridge.org

QUESTÃO 21

Read the fragment from the text.

"When I finish the two months' work, I <u>want to travel</u> in and around Namibia for three weeks." (lines 19, 20 and 21)

Because it is a plan, it is possible to rewrite the sentence substituting the underlined part for:

(A) am traveling.
(B) like traveling.
(C) am going to travel.
(D) can travel.
(E) traveled.

QUESTÃO 22

Which verb forms respectively complete the gaps in text I?

(A) is living / leaves
(B) lives / is living
(C) is living / lives
(D) leaves / is living
(E) leaves / is leaving

QUESTÃO 23

Read the fragment from the text.

"Some of <u>them</u> go to other countries and work as volunteers." (lines 2 and 3)

What does the object pronoun <u>them</u> refer to?

(A) Schools and hospitals.
(B) People in general.
(C) Hospital volunteers.
(D) Young people.
(E) College students.

QUESTÃO 24

Read the statements below to check if they are true (T) or false (F), and choose the option that respectively represents the statements.

( ) Some volunteers work with preservation.
( ) Mike Coleman often works in a hospital.
( ) Mike is happy because the work is hard.
( ) It's a personal experience, in Mike's opinion.

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

QUESTÃO 25

Mark the right option to fill in the following sentence.

Why is Mike Coleman in Namibia, South Africa? Because_____.

(A) he doesn't want to go to college.
(B) he wants to become a teacher.
(C) money is never important.
(D) it's a cheap way to travel.
(E) he believes that volunteering is nice.

Read the text II in order to answer items 26 and 27.

My name is Patrick. I _____ on vacation to Brazil last Summer, and I _____ in a five-star hotel in front of the beach in Rio de Janeiro.
I went to Rio by plane and I _____ a month there. I _____ a lot of people and we _____ a great time! I want to go back to Brazil as soon as possible.

QUESTÃO 26

According to text II, it's correct to say that the statements are true, EXCEPT:

(A) He liked the trip and intends to visit Brazil again.
(B) He flew to Rio de Janeiro to spend his vacation there.
(C) Patrick had a great time with many people.
(D) He traveled to Rio de Janeiro last summer.
(E) He spent thirty days in a hotel near the city of Rio de Janeiro.

QUESTÃO 27

Choose the option which completes the gaps in text I respectively.

(A) traveled / stayed / spend / knew / had
(B) traveled / were / spent / knew / did
(C) went / stayed / spent / met / had
(D) went / were / spend / met / did
(E) were / went / stayed / knew / have

Read text III in order to answer items 28 to 30.

The Vikings
Raiders, travelers or brave explorers?

The Vikings sailed the seas, attacked towns, and stole treasures all over Europe between 800 and 1100. They started from Scandinavia and attacked many countries in Europe. They settled in Britain, Ireland and France. They also crossed the Atlantic Ocean and arrived in Iceland and Greenland. They discovered North America but they also traveled east to Russia and south to Arabia.

They were good farmers and excellent shipbuilders. They used their ships for war. They also used them to carry people and goods to new lands. In winter, when there was not much farm work to do, they stayed home and did other interesting jobs. Men made swords to use them in battle. The Vikings liked swords so much they often decorated them with gold and gave them names. Women cooked and made clothes, shoes, and jewelry for themselves, _____ children and husbands.

In 866 the Vikings captured an Anglo-Saxon town. They called it Jorvik and it was the capital of the Viking kingdom for 200 years. They made Jorvik rich and one of the most famous cities in Britain. Some years ago, archeologists discovered part of that Viking town in York, the modern city of Jorvik. They found many things such as jewelry, coins and clothes. If you ever go to York and you want to travel back in time and see how the Vikings lived, visit the Jorvik Centre!

Adapted from Wilson, D. M. (1987) The Vikings, Activity Book, British Museum Press
http://www.pi-schools.gr/books/gymnasio/aggl_a_prox/ergas/043-060.pdf

QUESTÃO 28

All the statements below are correct about the Vikings, EXCEPT that they

(A) were good at farming and shipbuilding.
(B) were a people who enjoyed traveling by ship.
(C) liked jewelry and swords.
(D) were in the Americas before Columbus.
(E) all lived in Jorvik from 866 to 1066.

QUESTÃO 29

Which possessive form completes the gap in text III?

(A) their
(B) her
(C) his
(D) hers
(E) theirs

QUESTÃO 30

The Vikings used their ships to

(A) steal Scandinavia's treasures.
(B) become good shipbuilders.
(C) build villages all over Europe.
(D) sail the seas, to carry people and goods and for war.
(E) stay inside them during the cold winter.

QUESTÃO 31

Mark the INCORRECT option according to the Genitive Case.

(A) The door's car is open.
(B) The world's population is increasing.
(C) I'm going to Grandma's.
(D) Which are Fred's and Eric's cars?
(E) This is my mother-in-law's house.

QUESTÃO 32

Read the information in the box below.

```
                FOOD FACTS
  -   There's .81 ounces of sugar in an orange.
  -   There are twelve eggs in a cartoon.
  -   There are about 126 calories in a banana.
```

Now read the questions.

I-   How many sugar is there in an orange?
II- How much sugar is there in an orange?

I-   How many eggs are there in a carton?
II- How much eggs are there in a carton?

I-   How many calories are there in a banana?
II- How much calorie is there in a banana?

Choose the right questions for the information in the box respectively:

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

QUESTÃO 33

Read the sentences below.

I-   I work hardly every day.
II-   My classmates speak French very well.
III- Ana drives incredibly fast.
IV-   Our father is a very carefully driver.

Choose the option according to the correct use of the adverbs and modifiers.

(A) Only the sentences I, III and IV are correct.
(B) Only the sentences I and III are correct.
(C) Only the sentences II and III are correct.
(D) Only the sentences II, III and IV are correct.
(E) Only the sentences III and IV are correct.

QUESTÃO 34

Read the sentences below.

I-   Can you give me some information, please?
II-   Those women are my teachers.
III- He doesn't have much money.
IV-   Life is great!

Choose the option which defines the underlined nouns as U (uncountable) or C (countable).

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

QUESTÃO 35

Match the questions to the answers.

(1) Are you on vacation?
(2) Where's she from?
(3) Are you and Ana married?
(4) Is Julie Italian?

( ) Yes, we are.
( ) She's from Italy.
( ) No, she isn't.
( ) No, I'm not.

Choose the option with the correct order.

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

QUESTÃO 36

Complete the sentences using an article when necessary.

I- Is Mario _____ honest man?
II- The students wear _____ uniform here.
III- _____ Smiths live next to the supermarket.
IV- _____ Brasilia was made the capital in 1960.

Choose the correct option.

(A) a / an / - / -
(B) a / an / The / The
(C) an / a / The / The
(D) a / an / - / The
(E) an / a / The / -

QUESTÃO 37

Mark the option in which all the verbs are written in the Simple Past.

(A) put - drank - ate - heard - taken
(B) knew - brought - wanted - made - was
(C) wrote - come - felt - had - flew
(D) told - were - begun - gave - read
(E) left - spent - slept - swum - traveled

QUESTÃO 38

Complete the dialogue using the right form of the adjectives.

A: Would you like to go to the beach on Friday?
B: Actually, I think Saturday is _____ for me. Friday is my _____ day.

Choose the item that respectively completes the gaps.

(A) the best / busier
(B) better / busiest
(C) good / the most busiest
(D) best / the busiest
(E) good / the busier

QUESTÃO 39

Complete the sentences with the correct use of the Simple Past and the Past Continuous.

- I was waiting for the bus when I _____ (see) her.
- The children _____ (argue) when the teacher arrived.
- Everyone _____ (listen) to music when the lights _____ (go) out.

To fill in the gaps respectively, mark the right option.

(A) saw / was arguing / were listening / went
(B) was seeing / was arguing / listened / were
(C) were weeing / argued / listenned / were
(D) saw / were arguing / was listening / went
(E) was seing / argued / listened / were going

QUESTÃO 40

Complete the paragraph with a proper preposition.

I'm Hannah and I work _____ an office in London. During the week, I get up _____ six-thirty. I go _____ work by subway, but _____ Sundays I like waking up late because I don't work _____ weekends.

Choose the right option to fill in the gaps with the correct prepositions.

(A) in / at / to / on / on
(B) at / at / to / in / at
(C) on / about / at / at / on
(D) at / about / at / on / at
(E) in / about / to / in / at

DIRETORIA DE ENSINO DA MARINHA

Concurso Público de Admissão ao Colégio Naval (CPACN) em 2017. A Diretoria de Ensino da Marinha divulga, após a análise de recursos, os gabaritos referentes à Prova Escrita da 1ª Fase (Matemática e Inglês), realizada em 20 de maio de 2017.

Publicado em 03 de agosto de 2017.

1ª Fase - Prova de Matemática e Inglês							
AMARELA				VERDE			
01	-	B	21	-	C	01	-	E	21	-	A
02	-	E	22	-	B	02	-	D	22	-	B
03	-	B	23	-	D	03	-	B	23	-	E
04	-	D	24	-	A	04	-	D	24	-	D
05	-	D	25	-	E	05	-	B	25	-	C
06	-	D	26	-	E	06	-	B	26	-	C
07	-	D	27	-	C	07	-	D	27	-	E
08	-	B	28	-	E	08 Anulada			28	-	D
09	-	C	29	-	A	09	-	C	29	-	A
10	-	C	30	-	D	10	-	B	30	-	E
11	-	B	31	-	A	11	-	D	31	-	B
12	-	D	32	-	B	12	-	E	32	-	A
13 Anulada			33	-	C	13	-	B	33	-	A
14	-	E	34	-	A	14	-	D	34	-	A
15	-	E	35	-	A	15	-	C	35	-	B
16	-	B	36	-	E	16	-	E	36	-	B
17	-	A	37	-	B	17	-	A	37	-	A
18	-	B	38	-	B	18	-	C	38	-	E
19	-	B	39	-	D	19	-	B	39	-	C
20	-	C	40	-	A	20	-	B	40	-	D