Международный благотворительный фонд
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ЗАПИСКИ «ФОРМУЛЫ ЕДИНСТВА»
ВЫПУСК 5

СБОРНИК ЗАДАЧ ОЛИМПИАДЫ
«ФОРМУЛА ЕДИНСТВА»
«ТРЕТЬЕ ТЫСЯЧЕЛЕТИЕ»
ПО АНГЛИЙСКОМУ ЯЗЫКУ
И МАТЕМАТИКЕ
ЗА 2020 ГОД

УЧЕБНОЕ ПОСОБИЕ

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Условия задач

Английский язык
Отборочный этап

5–6 классы

20.1.   Сопоставьте начало (1–10) и окончание (А–К) пословиц (напишите соответствующую букву):
1)   You can't have your cake . . .
2)   You can choose your friends . . .
3)   Let the cat . . .
4)   Two is company, . . .
5)   When the cat's away . . .
6)   One hand . . .
7)   There's no place . . .
8)   There's always more fish . . .
9)   Two heads are . . .
10) The apple never falls . . .
А)   . . . out of the bag.
Б)   . . . and eat it.
В)   . . . better than one.
Г)   . . . washes the other.
Д)   . . . like home.
Е)   . . . in the sea.
Ж)   . . . the mice will play.
З)   . . . but you can't choose your family.
И)   . . . far from the tree.
К)   . . . but three's a crowd.

20.2. Вставьте **одно** пропущенное слово, обращая внимание на заглавные и строчные буквы:
1) We went to the cinema, but the film _____ not very good.
2) They clean _____ teeth every morning.
3) Butter _____ made from milk.
4) Some snakes are _____ dangerous than crocodiles.
5) How _____ water do you need to wash this car?
6) Their mother is _____ architect.
7) Please be quiet. Our children _____ sleeping.
8) Sue is from France. She is _____.
9) I _____ bought this beautiful dress in the shop over there.
10) Please wait _____ me.

20.3. Напишите записку (50–100 слов) Вашему другу Роберту, приглашая его в кино. Не забудьте договориться о месте и времени встречи, сообщить стоимость билета и о чём фильм.

Замечание. Артикли и сокращённые грамматические формы считаются за одно слово.

7–8 классы

20.4. Сопоставьте начало (1–10) и окончание (A–K) пословиц (напишите соответствующую букву):
1) Laughter is . . .
2) You can choose your friends . . .
3) Oil and water . . .
4) Two is company, . . .
5) When the cat's away . . .
6) Silence is . . .
7) There's no place . . .
8) There's always more fish . . .
9) Two heads are . . .
10) Two blacks . . .
A) . . . don't mix.

Б)   ... the best medicine.
В)   ... better than one.
Г)   ... golden.
Д)   ... like home.
Е)   ... in the sea.
Ж) ... the mice will play.
З)   ... but you can't choose your family.
И)   ... don't make a white.
К)   ... but three's a crowd.

20.5.   Вставьте **одно** пропущенное слово, обращая внимание на заглавные и строчные буквы:
1)   The water looks nice. Let's go _____ a swim.
2)   Who _____ seen the film? Is it interesting?
3)   We _____ invited to the party, but we didn't go.
4)   When they arrived to the cinema, the film _____ already begun.
5)   What _____ he doing at 5 o'clock yesterday?
6)   When _____ you buy these shoes? I like them a lot!
7)   There _____ nobody in the house. It's empty.
8)   You speak Chinese very _____. I envy you, I speak much worse.
9)   I can't talk to you now. I _____ talk to you later if I have more time.
10) Athens is older _____ Rome.

20.6.   Write a note (50–100 words) to your teacher Mrs Brown explaining why you were absent from school yesterday.
        Notice, that articles and contractions are counted as one word each.

9–10 классы

20.7.   1. Match the following English idioms (1–10) with their definitions (A–J):

1) Cut corners
2) Caught between two stools
3) Cat got your tongue?
4) A little bird told me
5) See eye to eye
6) Cross your fingers
7) Big fish in a small pond
8) A skeleton in the closet
9) A piece of cake
10) Back seat driver
A) To hope that something happens
B) I was told by an undisclosed source
C) Doing things in an easy way, to avoid expense or effort
D) An important person but only so within a small area of influence
E) A secret and possibly ruinous source of shame
F) When two or more people agree
G) Someone who criticizes from the side-lines without being directly involved
H) Finding it difficult to choose between two alternatives
I) When someone is inexplicably silent
J) A very easy task

20.8. Complete the sentences with **one** missing word:
1) How much money _____ stolen in the robbery last week?
2) — I've just seen Mary.
   — Oh, _____ you? How is she?
3) I am _____ to driving on the left because I've lived in Britain for a long time.
4) I looked out of the window and saw David _____ his bike along the road.
5) I could hear music coming from the house. There must _____ been somebody at home.

6) We _____ able to solve most of the problems we had.
7) We met some people _____ car had broken down.
8) They have lived in _____ same house for a long time.
9) I feel sorry _____ Sarah. She's had a lot of bad luck.
10) Shall I leave the lights _____ or turn them off?

20.9. Write a note to your parents asking for some advice (50–100 words). You are going to buy a book but you don't know which one to choose.

Notice, that articles and contractions are counted as one word each.

11 класс

20.10. Match the following English proverbs (1–10) with their definitions (A–J):
1) Get off on the wrong foot
2) A hot potato
3) Get over it
4) A knight in shining armour
5) Can't think straight
6) Every cloud has a silver lining
7) Under the weather
8) The icing on the cake
9) Smell a rat
10) As keen as mustard
A) A current issue which many people are talking about and which is controversial
B) This expression is usually said as an encouragement to a person who is overcome by some difficulty and is unable to see any positive way forward
C) Make a bad start to a project or relationship
D) Very enthusiastic
E) To begin to suspect that things aren't as they should be
F) Something that makes a good situation even better

G) Don't concern yourself with something that's already in the past; accept it and move on to more productive pursuits

H) Feeling ill

I) A person who comes to the aid of another when other hopes have faded

J) to be overwhelmed and stressed and it is affecting one's ability to think

20.11. Complete the sentences with **one** missing word:

1) We always _____ to stay late on Fridays as we have lots of homework these days.

2) It was almost as if the wolf was more scared of us _____ we were of it.

3) Were the elections to be held today, the Liberals _____ win easily.

4) Hi, Pete! I didn't expect to see you. Sonia said you _____ in hospital.

5) Before you enter the competition, please bear in _____ that you're not as young as you used to be!

6) The meeting was _____-consuming and not very interesting.

7) — Do you know where Kate is?
   — Yes, that's horrible! She has _____ arrested.

8) People there wish they _____ not live in such harsh conditions.

9) The plane was out of control and had to make a crash _____.

10) Unfortunately, the doctors say her condition is slow _____ respond to treatment.

20.12. Write a note to your parents asking for some advice (50–100 words). Your friend has borrowed some money and you don't know how to ask him/her about it.

Notice, that articles and contractions are counted as one word each.

Заключительный этап

5 класс

20.13.   Заполните пропуски в рассказе одним из соответствующих слов A, B, C или D:

Going through the forest is my   [1]   part of the walk. My dog Benji loves it too. I'm Grace. I live on a farm with my parents and I take Benji for a walk most days after school. While Benji's playing, I stop to   [2]   a photo of a butterfly. I'm thinking about posting it on Facebook, but then I hear Benji barking. He's jumping and running around a boy. The poor boy looks   [3] . "Benji, stop! Come here!" I call and throw him his ball. I'm about to say sorry to the boy, but he's gone.

It's cold today, so Benji and I are walking fast. As we go through the forest, it starts raining so I run. Suddenly, I fall and I'm on my back. OUCH! That hurt!

Then there's someone there and a voice asks "Are you all right?" I look up and see the boy from yesterday.

"I'm OK," I say and the boy helps me up.

"I haven't seen you at school. Do you live near here?" I   [4] .

"No, I'm from Manchester," he says. "Sorry! I have to go. Can you walk? Do you   [5]   help?"

"No, I'm fine. Thanks!" I say and the boy walks away.

"I'm Grace," I call. "What's your name?" but he's already gone.

[1]   A) favourite   B) lovely   C) better   D) nice
[2]   A) bring   B) do   C) make   D) take
[3]   A) sleepy   B) worried   C) cheerful   D) funny
[4]   A) phone   B) ask   C) cry   D) name
[5]   A) go   B) call   C) need   D) say

20.14.   Выберите подходящий ответ:

1)   Sam speaks Japanese but ____ French.

A) he doesn't speak   B) he don't speak
C) he doesn't speaks   D) he isn't speak

2) The dog is lying ___ the door.
   A) between   B) beside   C) on   D) round

3) Where are my keys? I think I put ___ on the table.
   A) they   B) their   C) themselves D) them

4) We will arrive at Helsinki Airport ___ 14:30.
   A) at   B) in   C) on   D) over

5) The police ___ and arrested this man last week.
   A) has caught B) cought   C) caught   D) catched

6) How ___ ?
   A) languages do you speak   B) is your father
   C) music did you listen to yesterday   D) is you

7) I ___ come by your house next Tuesday.
   A) did   B) was   C) have   D) will

8) He dances ___ the Waltz. I really like it!
   A) bad   B) beautifully C) beautiful D) good

9) ___ was hurt seriously in the car crash.
   A) Nobody   B) Anybody   C) Anyone   D) Somewhere

10) Mary ___ her bag.
    A) did probably lose   B) probably lost
    C) have probably lost   D) has probably lost

20.15. Прочитайте адаптированный отрывок из текста Толкиена «Хоббит» и ответьте на вопросы к нему:

In a hole in the ground there lived a hobbit. It had a round door painted green, with a shiny yellow knob in the middle. The door opened on to a hall like a tunnel: a very comfortable tunnel with panelled walls, and floors tiled and carpeted, with polished chairs, and lots and lots of pegs for hats and coats — the hobbit was fond of visitors. Bedrooms, bathrooms, cellars, wardrobes (he had whole rooms for clothes), kitchens, dining-rooms, all were on the same floor. The best rooms were all on the left-hand side with round windows looking over his garden and the river.

This hobbit was a very well-to-do hobbit, and his name was Baggins. The Bagginses had lived in The Hill for time out of mind... This is a story of how a Baggins had an adventure...

What is a hobbit? They are (or were) a little people, about half our height, and smaller than the bearded Dwarves. Hobbits have no beards. There is little or no magic about them, except the ordinary everyday sort which helps them to disappear quietly and quickly. They are fat in the stomach; they dress in bright colours (chiefly green and yellow); wear no shoes, because their feet grow natural leathery soles and thick warm brown hair like the stuff on their heads (which is curly); have long clever brown fingers, good-natured faces, and laugh deep fruity laughs (especially after dinner, which they have twice a day when they can get it). Now you know enough to go on with.

1) Did the hobbit like having guests?

   A) No.   B) Yes.   C) We don't know.

2) How many floors did his house have?

   A) Three.   B) Many.   C) One.

3) What clothes do the hobbits prefer?

   A) They wear bright colours and leather shoes.

   B) They wear mostly green and yellow clothes and no shoes.

   C) They wear a green and yellow leather dress and no shoes.

4) What did the hobbits look like?

   A) They had beards and they were bald and fat.

   B) They were fat and they had curly hair but no beard.

   C) They were not fat. They had curly hair and short fingers.

5) How tall are hobbits?

   A) They are smaller than Dwarves and people.

   B) They are shorter than Dwarves but taller than people.

   C) They are taller than Dwarves but smaller than people.

20.16. Напишите эссе (100–200 слов) на одну из следующих тем:

A)   Dog is a man's best friend.
B)   A friend in need is a friend indeed.
C)   Home is where the heart is.

6 класс

20.17.   Заполните пропуски в рассказе одним из соответствующих слов A, B, C или D:

One night in December 2011, a bear came into the city of Vancouver in Canada. It walked   [1]   the city streets past houses, shops and offices. Then it found some food in bins outside a restaurant and started eating. In the morning, someone saw the bear and called the police. The police came with a   [2]   from the city zoo. They put the bear in a lorry and took it to the mountains outside the city. But what happens in other countries when big animals come into cities? In Vancouver it is   [3]   to see a bear, but in some cities you can see big animals on the city streets every day.

Big animals usually come into cities to find food. In South Africa baboons come into the city when they are hungry. They go into gardens and eat fruit from trees. They even go into houses and take food from cupboards and fridges! Baboons are strong animals and they can scare people. But the city can be   [4]   for baboons too. Sometimes, cars and buses kill baboons in accidents. Human food is very bad for the baboons' teeth because it has a lot of sugar. Now, there are special people who find baboons in the city and   [5]   them to the countryside.

[1]   A) through   B) beside   C) near   D) next to
[2]   A) nurse   B) teacher   C) firefighter D) vet
[3]   A) funny   B) unusual   C) cheerful   D) angry
[4]   A) safe   B) dangerous   C) nice   D) favourite
[5]   A) go   B) fight   C) return   D) put

20.18.   *Смотри задачу* **20.14**.

20.19.   *Смотри задачу* **20.15**.

20.20.   *Смотри задачу* **20.16**.

7 класс

20.21.   Заполните пропуски в рассказе одним из соответствующих слов A, B, C или D:

That's what life is like for YouTube star, Jessii Vee from Canada. More than 150 million people watch her videos of funny stories about herself, and subscribers to her channel   [1]   every day.

"I spend all of Sunday having ideas for videos to film that week," says Jessii. "Then, on Monday, I wake up early to start making the videos. Usually, a video takes just over an hour to make."

Jessii also spends a few hours a week writing to her fans. "One day I went to buy coffee," she says, "and the girl serving me almost dropped my coffee when she saw it was me. She left the coffee shop to   [2]   me outside to take pictures. It always makes me happy to see my fans are happy."

If you want to start a YouTube channel, there are some things to think about. Being safe is very   [3] , so don't show your face or real name and don't tell people where you live. One of the most   [4]   YouTubers, DanTDM, a 26-year-old English man, didn't show his face in the beginning and now his videos have over 10 billion   [5] . Five billion people all over the world watched the Beijing 2008 Summer Olympics.

[1]   A) grow   B) swim   C) take   D) feed
[2]   A) come   B) lose   C) buy   D) meet
[3]   A) intelligent B) important   C) cheerful   D) kind
[4]   A) safe   B) famous   C) nice   D) favourite
[5]   A) directors   B) films   C) views   D) watches

20.22.   Выберите подходящий ответ:

1)   My father ____ Poland but I haven't.

A) has gone in   B) has been to
C) has been in   D) has gone at

2)   The dog is lying ____ the door.

   A) between   B) beside   C) over   D) round

3) Stephen is my oldest friend. I met him a long time ___ .
   A) before   B) until   C) ago   D) yet

4) Her English is ___ better than it was last year.
   A) much   B) very   C) many   D) any

5) The police ___ and arrested this man last week.
   A) has caught B) cought   C) caught   D) catched

6) How ___ ?
   A) languages do you speak   B) is your father
   C) music did you listen to yesterday   D) is you

7) No one enjoyed the show the show very much, ___ ?
   A) had they   B) didn't they
   C) hadn't they   D) did they

8) Hurry. There is very ___ time left.
   A) few   B) little   C) several   D) many

9) ___ was hurt seriously in the car crash.
   A) Nobody   B) Anybody   C) Anyone   D) Somewhere

10) Mary ___ her bag.
   A) did probably lose   B) probably lost
   C) have probably lost   D) has probably lost

20.23. Прочитайте адаптированный отрывок из текста Толкиена «Хоббит» и ответьте на вопросы к нему:

Bilbo Baggins put on an apron, lit fires, boiled water, and washed up. Then he had a nice little breakfast in the kitchen before turning out the dining-room. By that time the sun was shining; and the front door was open, letting in a warm spring breeze. Bilbo began to whistle loudly and to forget about the night before. In fact he was just sitting down to a nice little second breakfast in the dining-room by the open window, when in walked Gandalf.

"My dear fellow," said he, "whenever are you going to come? What about an early start? — and here you are having breakfast,

or whatever you call it, at half past ten! They left you the message, because they could not wait."

"What message?" said poor Mr. Baggins all in a fluster.

"If you had dusted the mantelpiece, you would have found this just under the clock," said Gandalf, handing Bilbo a note (written, of course, on his own note-paper).

"That leaves you just ten minutes. You will have to run," said Gandalf.

"But —," said Bilbo.

"No time for it," said the wizard.

"But —," said Bilbo again.

"No time for that either! Off you go!"

To the end of his days Bilbo could never remember how he found himself outside, without a hat, a walking-stick or any money, or anything that he usually took when he went out; leaving his second breakfast half-finished and quite unwashed-up, pushing his keys into Gandalf's hands, and running as fast as his furry feet could carry him down the lane, past the great Mill, across The Water, and then on for a mile or more. Very puffed he was, when he got to Bywater just on the stroke of eleven, and found he had come without a pocket-handkerchief!

"Bravo!" said Balin who was standing at the inn door looking out for him.

Just then all the others came round the corner of the road from the village. They were on ponies, and each pony was slung about with all kinds of baggages, packages, parcels. There was a very small pony for Bilbo.

"Up you two get, and off we go!" said Thorin.

"I'm awfully sorry," said Bilbo, "but I have come without my hat, and I have left my pocket-handkerchief behind, and I haven't got any money. I didn't get your note until after 10.45 to be precise."

"Don't be precise," said Dwalin, "and don't worry! You will have to manage without pocket-handkerchiefs, and a good many other things, before you get to the journey's end. As for a hat, I have got a spare hood and cloak in my luggage."

That's how they all came to start, jogging off from the inn one fine morning just before May, on laden ponies; and Bilbo was wearing a dark-green hood (a little weather-stained) and a dark-green cloak borrowed from Dwalin. They were too large for him, and he looked rather comic. His only comfort was he couldn't be mistaken for a dwarf, as he had no beard.

They had not been riding very long, when up came Gandalf very splendid on a white horse. He had brought a lot of pocket-handkerchiefs, and Bilbo's pipe and tobacco. So after that the party went along very merrily, and they told stories or sang songs as they rode forward all day, except of course when they stopped for meals. These didn't come quite as often as Bilbo would have liked them, but still he began to feel that adventures were not so bad after all.

1) Where was the message from the dwarves for Bilbo?

    A) On the table.   B) On his fireplace.
    C) On the bed.

2) What time did Bilbo arrive at the meeting point at Bywater?

    A) At half past ten.   B) At 10:45.
    C) At 11 o'clock.

3) What did Dwalin lend Bilbo?

    A) His pocket handkerchief and a pipe.
    B) Some clothes.   C) A pony and a hood.

4) Why does the writer say that Bilbo didn't look like dwarves?

    A) He didn't have a beard.   B) His clothes were too big.
    C) He looked comic.

5) Why was not Bilbo completely satisfied with the adventure at the end of this extract?

    A) He didn't get enough food.
    B) His pipe was wet.
    C) They rode forward too fast.

20.24. Напишите эссе (100–250 слов), высказав свою точку зрения на **одно** из высказываний:

A) "Friends show their love in times of trouble, not in happiness." *Euripides*

B) "Everything has beauty, but not everyone sees it." *Confucius*

C) "Change your thoughts and you change your world." *Norman Vincent Peale*

D) "Where there is love there is life." *Mahatma Gandhi*

8 класс

20.25. Read the text below and decide which answer A, B, C or D best fits each space:

Aristotle lived ___[1]___ the same time when Philip of Macedonia was attacking areas of Greece such as Attica. Aristotle ___[2]___ to Athens when he was only 17 to study philosophy with Plato. In 343 BC he became a tutor for Alexander the Great, whom he taught for four years. Aristotle ___[3]___ the Lyceum, which was well known for its zoo and library, a public garden and a gymnasium. Unfortunately, only a fifth of his writings have ___[4]___. In spite of this, his influence as a philosopher has continued to the ___[5]___ day.

[1] A) on   B) throughout C) during   D) over
[2] A) reached   B) flew   C) landed   D) went
[3] A) form   B) founded   C) based   D) imposed
[4] A) traced   B) survived   C) rescued   D) saved
[5] A) current   B) now   C) present   D) close

20.26. Choose the best answer:

1) My father has ___ Poland but I haven't.

   A) gone in   B) been to   C) been in   D) gone at

2) If he were better off, he ___ a car.

   A) buys   B) would buy
   C) would have bought   D) will buy

3) The new theater ___ next month.

A) are opened   B) was opened

C) will be opened   D) will opens

4) Sophie stopped ___ the medicine, as it wasn't doing any good.

A) taking   B) to take   C) take   D) have taken

5) The police ___ and arrested this man last week.

A) has caught   B) cought   C) caught   D) catched

6) How ___

A) languages do you speak?   B) is your father?

C) music did you listen to yesterday?   D) is you?

7) No one enjoyed the show the show very much, ___ they?

A) had   B) didn't   C) hadn't   D) did

8) It's ___ cold today to go surfing.

A) much   B) too   C) very   D) fat

9) ___ was hurt seriously in the car crash.

A) Nobody   B) Anybody   C) Anyone   D) Somewhere

10) Mary ___ her bag.

A) did probably lose   B) probably lost

C) have probably lost   D) has probably lost

20.27. *Смотри задачу* **20.23**.

20.28. Напишите эссе (100–250 слов), высказав свою точку зрения на **одно** из высказываний:

A) "Friends show their love in times of trouble, not in happiness." *Euripides*

B) "Everything has beauty, but not everyone sees it." *Confucius*

C) "Life's most persistent and urgent question is, «What are you doing for others?»" *Martin Luther King, Jr.*

D) "Change your thoughts and you change your world." *Norman Vincent Peale*

9 класс

20.29. Read the text below and decide which answer A, B, C or D best fits each space:

Is fast food really that bad for us? Some experts __[1]__ that all food is nutritious to some degree and that it all depends on how we __[2]__ it in our diet. Chips, for example, are a fairly good source of vitamin C. What is more, the cheese on pizzas is __[3]__ in protein and burgers contain protein, __[4]__ and vitamins. However, all these foods have lots of fat, cholesterol and calories which can lead to weight problems and heart __[5]__ .

[1] A) request   B) claim   C) ask   D) demand
[2] A) enclose   B) involve   C) encircle   D) include
[3] A) great   B) big   C) high   D) tall
[4] A) iron   B) steel   C) gold   D) silver
[5] A) unwell   B) sickness   C) disease   D) infection

20.30. Choose the best answer:

1) Don't forget to call Kate, ____ you?
   A) don't   B) will   C) do   D) shall

2) If Bob ____ his leg, he could have come with us.
   A) didn't break   B) hadn't broken
   C) wouldn't have broken   D) will not break

3) The new theater ____ next month.
   A) are opened   B) was opened
   C) will be opened   D) will opens

4) Sophie stopped ____ the medicine, as it wasn't doing any good.
   A) taking   B) to take   C) take   D) have taken

5) The robbers ____ by the police last week.
   A) had been arrested   B) arrested
   C) were arrested   D) were arresting

6) A few years ago my friend ___ in Canada when he lost his passport.

   A) was travelled   B) was travelling
   C) has travelled   D) used travel

7) They arrived to the airport on time but the plane ___ .

   A) had already leave   B) has already left
   C) already left   D) had already left

8) It's ___ cold today to go surfing.

   A) much   B) too   C) very   D) fat

9) ___ was hurt seriously in the car crash.

   A) Nobody   B) Anybody   C) Anyone   D) Somewhere

10) Mary ___ her bag.

   A) did probably lose   B) probably lost
   C) have probably lost   D) has probably lost

20.31. Read the extract from "The Hobbit" by Tolkien and answer the questions:

When Bilbo opened his eyes, he wondered if he had; for it was just as dark as with them shut. No one was anywhere near him. Just imagine his fright! He could hear nothing, see nothing, and he could feel nothing except the stone of the floor.

Very slowly he got up, he touched the wall of the tunnel; but neither up nor down it could he find anything: nothing at all, no sign of goblins, no sign of dwarves. His head was swimming, and he was far from certain even of the direction they had been going in when he had his fall. He guessed as well as he could, and crawled along for a good way, till suddenly his hand met what felt like a tiny ring of cold metal lying on the floor of the tunnel. It was a turning point in his career, but he did not know it. He put the ring in his pocket almost without thinking; certainly it did not seem of any particular use at the moment. He did not go much further, but sat down on the cold floor and gave himself up to complete miserableness, for a long while. He thought of himself

frying bacon and eggs in his own kitchen at home — for he could
feel inside that it was high time for some meal or other; but that
only made him miserabler.

He could not think what to do; nor could he think what had
happened; or why he had been left behind; or why, if he had been
left behind, the goblins had not caught him; or even why his head
was so sore. The truth was he had been lying quiet, out of sight
and out of mind, in a very dark corner for a long while.   But
somehow he was comforted. It was rather splendid to be wearing
a blade made in Gondolin for the goblin-wars of which so many
songs had sung; and also he had noticed that such weapons made
a great impression on goblins that came upon them suddenly.

Suddenly without any warning he trotted splash into water! Ugh!
it was icy cold. That pulled him up sharp and short. He did not
know whether it was just a pool in the path, or the edge of an
underground stream that crossed the passage, or the brink of a
deep dark subterranean lake. The sword was hardly shining at all.
He stopped, and he could hear, when he listened hard, drops drip-
drip-dripping from an unseen roof into the water below; but there
seemed no other sort of sound.

"So it is a pool or a lake, and not an underground river," he
thought. Still he did not dare to wade out into the darkness. He
could not swim; and he thought, too, of nasty slimy things, with
big bulging blind eyes, wriggling in the water. There are strange
things living in the pools and lakes in the hearts of mountains:
fish whose fathers swam in, goodness only knows how many years
ago, and never swam out again, while their eyes grew bigger and
bigger and bigger from trying to see in the blackness; also there
are other things more slimy than fish.

Deep down here by the dark water lived old Gollum, a small slimy
creature. I don't know where he came from, nor who or what
he was. He was Gollum — as dark as darkness, except for two
big round pale eyes in his thin face. He had a little boat, and he
rowed about quite quietly on the lake; for lake it was, wide and
deep and deadly cold. He was looking out of his pale lamp-like

eyes for blind fish, which he grabbed with his long fingers as quick as thinking. Actually Gollum lived on a slimy island of rock in the middle of the lake. He was watching Bilbo now from the distance with his pale eyes like telescopes. Bilbo could not see him, but he was wondering a lot about Bilbo, for he could see that he was no goblin at all.

Gollum got into his boat and shot off from the island, while Bilbo was sitting on the brink altogether flummoxed and at the end of his way and his wits. Suddenly up came Gollum and whispered and hissed:

"Bless us and splash us, my preciousssss! I guess it's a choice feast; at least a tasty morsel it'd make us, gollum!" And when he said gollum he made a horrible swallowing noise in his throat. That is how he got his name, though he always called himself 'my precious'.

The hobbit jumped nearly out of his skin when the hiss came in his ears, and he suddenly saw the pale eyes sticking out at him.

1) How did Bilbo feel right after finding the ring?

    A) Unhappy, angry and comforted.

    B) Unhappy, hungry and confused.

    C) Hungry, furious but comforted.

2) How did Bilbo realize that he was near a lake not a river?

    A) There were rain drops.

    B) He couldn't hear the sound of moving water.

    C) He saw the brink of a deep dark subterranean lake.

3) What are some features of the fish in the lake?

    A) They had big eyes, were slimy and couldn't see.

    B) They had big eyes and lived with their fathers.

    C) They had big eyes and were slimy.

4) What objects did Gollum have when he met the hobbit and started speaking to him?

    A) A boat.   B) A boat and a lamp.

    C) A boat and a ring.

5) What did Gollum mean when he spoke to Bilbo?

   A) He knew that the hobbit had stolen something precious.
   B) Gollum was going to eat the hobbit.
   C) He was going to give a morsel to Bilbo.

20.32. Choose one of the following quotes and write an essay (100–250 words) giving your opinion on it:

A) "Learning never exhausts the mind." *Leonardo da Vinci*
B) "The secret of getting ahead is getting started." *Mark Twain*
C) "Life's most persistent and urgent question is, «What are you doing for others?»" *Martin Luther King, Jr.*
D) "Where there is love there is life." *Mahatma Gandhi*
E) "Real friends are our greatest joy and our greatest sorrow." *Fénelon*

10 класс

20.33. Choose the correct pronunciation:

1) Since there is no time like the **present**, he thought it was time to **present** the present.

   A) 1st accent is on the first syllable, 2nd accent is on the second syllable.
   B) 1st accent is on the second syllable, 2nd accent is on the first syllable.
   C) 1st and 2nd accents are on the second syllables.
   D) 1st and 2nd accents are on the first syllables.

2) Since there is no time like the present, he thought it was time to **present** the **present**.

   A) 1st accent is on the first syllable, 2nd accent is on the second syllable.
   B) 1st accent is on the second syllable, 2nd accent is on the first syllable.
   C) 1st and 2nd accents are on the second syllables.
   D) 1st and 2nd accents are on the first syllables.

3) The dump was so full that it had to **refuse** more **refuse**.
   A) 1ˢᵗ and 2ⁿᵈ are pronounced like [z].
   B) 1ˢᵗ and 2ⁿᵈ are pronounced like [s].
   C) 1ˢᵗ "s" is pronounced like [z], 2ⁿᵈ "s" is pronounced like [s].
   D) 1ˢᵗ "s" is pronounced like [s], 2ⁿᵈ "s" is pronounced like [z].

4) We must **polish** the **Polish** furniture.
   A) 1ˢᵗ short "o" as in "hot, not, body", 2ⁿᵈ long "o" as in "boat, goat, coat".
   B) 1ˢᵗ long "o" as in "boat, goat, coat", 2ⁿᵈ short "o" as in "hot, not, body".
   C) 1ˢᵗ and 2ⁿᵈ are short "o" as in "hot, not, body".
   D) 1ˢᵗ and 2ⁿᵈ are long "o" as in "boat, goat, coat".

5) He could **lead** if he would get the **lead** out.
   A) 1ˢᵗ "ea" is as in "dead, dread, wed", 2ⁿᵈ "ea" is as in "tea, she, flee".
   B) 1ˢᵗ "ea" is as in "tea, she, flee", 2ⁿᵈ "ea" is as in "dead, dread, wed".
   C) 1ˢᵗ and 2ⁿᵈ are as in "dead, dread, wed".
   D) 1ˢᵗ and 2ⁿᵈ are as in "tea, she, flee".

6) The soldier decided to **desert** his **dessert** in the desert.
   A) 1ˢᵗ accent is on the second syllable, 2ⁿᵈ accent is on the first syllable".
   B) 1ˢᵗ accent is on the first syllable, 2ⁿᵈ accent is on the second syllable".
   C) 1ˢᵗ and 2ⁿᵈ are on the second syllables.
   D) 1ˢᵗ and 2ⁿᵈ are on the first syllables.

7) The soldier decided to desert his **dessert** in the **desert**.
   A) 1ˢᵗ accent is on the second syllable, 2ⁿᵈ accent is on the first syllable.
   B) 1ˢᵗ accent is on the first syllable, 2ⁿᵈ accent is on the second syllable.

C) 1st and 2nd are on the second syllables.

D) 1st and 2nd are on the first syllables.

8) The farm was used to **produce produce**.

    A) 1st accent is on the first syllable, 2nd accent is on the second syllable.

    B) 1st accent is on the second syllable, 2nd accent is on the first syllable.

    C) 1st and 2nd have the same pronunciation.

9) When shot at, the **dove dove** into the bushes.

    A) 1st "dove" is pronounced like "of, shove, glove", 2nd "dove" is pronounced like "rove, trove, stove".

    B) 1st "dove" is pronounced like "rove, trove, stove", 2nd "dove" is pronounced like "of, shove, glove".

    C) 1st and 2nd are pronounced like "rove, trove, stove".

    D) 1st and 2nd "dove" are pronounced like "of, shove, glove".

10) I did not **object** to the **object**.

    A) 1st accent is on the first syllable, 2nd accent is on the second syllable.

    B) 1st accent is on the second syllable, 2nd accent is on the first syllable.

    C) 1st and 2nd accents are on the second syllables.

    D) 1st and 2nd accents are on the first syllables.

20.34. Choose the best answer:

1) Don't forget to call Kate, ___ you?

    A) don't   B) will   C) do   D) shall

2) If Bob ___ his leg, he could have come with us.

    A) didn't break   B) hadn't broken

    C) wouldn't have broken   D) will not break

3) The new theater ___ next month.

    A) are opened   B) was opened

    C) will be opened   D) will opens

4) Sophie stopped ___ the medicine, as it wasn't doing any good.

    A) taking   B) to take   C) take   D) have taken

5) We ___ a party next Saturday. Can you come?

    A) are to have   B) 're having   C) 'll have   D) have

6) A few years ago my friend ___ in Canada when he lost his passport.

    A) was travelled   B) was travelling
    C) has travelled   D) used travel

7) They arrived to the airport on time but the plane ___ .

    A) had already leave   B) has already left
    C) already left   D) had already left

8) The building ___ destroyed by a fire.

    A) was survived the earthquake but then
    B) survived the earthquake but then was
    C) survived the earthquake but then
    D) was survived the earthquake but then was

9) ___ was hurt seriously in the car crash.

    A) Nobody   B) Anybody   C) Anyone   D) Somewhere

10) — What did you do to your hand?

    — I ___ when I was chopping vegetables.

    A) cut me   B) cut   C) myself cut   D) cut myself

20.35. *Смотри задачу* **20.31**.

20.36. Choose one of the following quotes and write an essay (100–250 words) giving your opinion on it:

A) "Learning never exhausts the mind." *Leonardo da Vinci*

B) "Independence is happiness." *Susan B. Anthony*

C) "There is only one corner of the universe you can be certain of improving, and that's your own self." *Aldous Huxley*

D) "All our dreams can come true, if we have the courage to pursue them." *Walt Disney*

E) "Think wrongly, if you please, but in all cases think for yourself." *Lessing*

11 класс

20.37. Choose the correct pronunciation:

1) The bandage was **wound** around the **wound**.
   - A) 1st "ou" as in "wow, how, now", 2nd "ou" as in "you, too, sue".
   - B) 1st "ou" as in "you, too, sue", 2nd "ou" as in "wow, how, now".
   - C) 1st and 2nd "ou" as in "you, too, sue".
   - D) 1st and 2nd "ou" as in "wow, how, now".

2) The farm was used to **produce produce**.
   - A) 1st accent is on the first syllable, 2nd accent is on the second syllable.
   - B) 1st accent is on the second syllable, 2nd accent is on the first syllable.
   - C) 1st and 2nd have the same pronunciation.

3) The dump was so full that it had to **refuse** more **refuse**.
   - A) 1st and 2nd are pronounced like [z].
   - B) 1st and 2nd are pronounced like [s].
   - C) 1st "s" is pronounced like [z], 2nd "s" is pronounced like [s].
   - D) 1st "s" is pronounced like [s], 2nd "s" is pronounced like [z].

4) We must **polish** the **Polish** furniture.
   - A) 1st short "o" as in "hot, not, body", 2nd long "o" as in "boat, goat, coat".
   - B) 1st long "o" as in "boat, goat, coat", 2nd short "o" as in "hot, not, body".
   - C) 1st and 2nd are short "o" as in "hot, not, body".
   - D) 1st and 2nd are long "o" as in "boat, goat, coat".

5) He could **lead** if he would get the **lead** out.
   A) 1st "ea" is as in "dead, dread, wed", 2nd "ea" is as in "tea, she, flee".
   B) 1st "ea" is as in "tea, she, flee", 2nd "ea" is as in "dead, dread, wed".
   C) 1st and 2nd are as in "dead, dread, wed".
   D) 1st and 2nd are as in "tea, she, flee".

6) The soldier decided to **desert** his **dessert** in the desert.
   A) 1st accent is on the second syllable, 2nd accent is on the first syllable".
   B) 1st accent is on the first syllable, 2nd accent is on the second syllable".
   C) 1st and 2nd are on the second syllables.
   D) 1st and 2nd are on the first syllables.

7) The soldier decided to desert his **dessert** in the **desert**.
   A) 1st accent is on the second syllable, 2nd accent is on the first syllable".
   B) 1st accent is on the first syllable, 2nd accent is on the second syllable".
   C) 1st and 2nd are on the second syllables.
   D) 1st and 2nd are on the first syllables.

8) A **bass** was painted on the head of the **bass** drum.
   A) 1st "bass" is pronounced like "base, vase, trace", 2nd "bass" is pronounced like "grass, glass, lass".
   B) 1st and 2nd ones are pronounced like "grass, glass, lass".
   C) 1st and 2nd ones are pronounced like "base, vase, trace".
   D) 1st "bass" is pronounced like "grass, glass, lass", 2nd "bass" is pronounced like "base, vase, trace".

9) When shot at, the **dove dove** into the bushes.
   A) 1st "dove" is pronounced like "of, shove, glove", 2nd "dove" is pronounced like "rove, trove, stove".

    B) 1st "dove" is pronounced like "rove, trove, stove", 2nd "dove" is pronounced like "of, shove, glove".

    C) 1st and 2nd are pronounced like "rove, trove, stove".

    D) 1st and 2nd "dove" are pronounced like "of, shove, glove".

10) I did not **object** to the **object**.

    A) 1st accent is on the first syllable, 2nd accent is on the second syllable.

    B) 1st accent is on the second syllable, 2nd accent is on the first syllable.

    C) 1st and 2nd accents are on the second syllables.

    D) 1st and 2nd accents are on the first syllables.

20.38. Choose the best answer:

1) When he realised I ___ away.

    A) looked at him, he was turning

    B) was looking at him, he turned

    C) was looking at him, he was turning

    D) looked at him, he turned

2) When I saw the vase on the website, I knew exactly what I ___ for.

    A) looked   B) look

    C) had been looking   D) have looked

3) We ___ a party next Saturday. Can you come?

    A) are to have B) 're having   C) 'll have   D) have

4) Walking under a ladder ___ be unlucky.

    A) is suppose to   B) should

    C) ought to   D) is supposed to

5) The building ___ destroyed by a fire.

    A) was survived the earthquake but then

    B) survived the earthquake but then was

    C) survived the earthquake but then

    D) was survived the earthquake but then was

6) Peter admitted ＿＿ the wallet.

    A) to steal   B) steal   C) stealing   D) him stealing

7) Samantha told ＿＿ that she was feeling ill.

    A) that she would be late for the meeting. She said
    B) that she would be late for the meeting. She said me
    C) me that she would be late for the meeting. She said
    D) me that she would be late for the meeting. She said me

8) We haven't got ＿＿ butter left.

    A) a   B) any   C) the   D) some

9) — What did you do to your hand?
    — I ＿＿ when I was chopping vegetables.

    A) cut me   B) cut   C) myself cut D) cut myself

10) If I had known how difficult the job was, I ＿＿ it.

    A) won't have taken   B) wouldn't have taken
    C) won't take it   D) mightn't have take

20.39. Read the extract from "The Hobbit" by Tolkien and answer the questions:

Hobbits can move quietly in woods, absolutely quietly. They take a pride in it. As for Bilbo walking primly towards the red light, I don't suppose even a weasel would have stirred a whisker at it. So, naturally, he got right up to the fire — for fire it was — without disturbing anyone. And this is what he saw.

Three very large persons sitting round a very large fire of beech-logs. They were toasting mutton on long spits of wood, and licking the gravy off their fingers. There was a fine toothsome smell. Also there was a barrel of good drink at hand, and they were drinking out of jugs. But they were trolls. Obviously trolls. Even Bilbo, in spite of his sheltered life, could see that: from the great heavy faces of them, and their size, and the shape of their legs, not to mention their language, which was not drawing-room fashion at all, at all.

"Mutton yesterday, mutton today, and blimey, if it don't look like mutton again tomorrer," said one of the trolls.

"Never a blinking bit of manflesh have we had for long enough," said a second. "What the 'ell William was a-thinkin' of to bring us into these parts at all, beats me — and the drink runnin' short, what's more," he said jogging the elbow of William, who was taking a pull at his jug.

William choked. "Shut yer mouth!" he said as soon as he could. "Yer can't expect folk to stop here for ever just to be et by you and Bert. You've et a village and a half between yer, since we come down from the mountains. How much more d'yer want? And time's been up our way, when yer'd have said 'thank yer Bill' for a nice bit o' fat valley mutton like what this is." He took a big bite off a sheep's leg he was roasting, and wiped his lips on his sleeve.

Yes, I am afraid trolls do behave like that, even those with only one head each. After hearing all this Bilbo ought to have done something at once. Either he should have gone back quietly and warned his friends that there were three fair-sized trolls at hand in a nasty mood, quite likely to try roasted dwarf, or even pony, for a change; or else he should have done a bit of good quick burgling. A really first-class and legendary burglar would at this point have picked the trolls' pockets — it is nearly always worthwhile, if you can manage it — , pinched the very mutton off the spits, purloined the beer, and walked off without their noticing him. Others more practical but with less professional pride would perhaps have stuck a dagger into each of them before they observed it. Then the night could have been spent cheerily.

Bilbo knew it. He had read of a good many things he had never seen or done. He was very much alarmed, as well as disgusted; he wished himself a hundred miles away, and yet — and yet somehow he could not go straight back to Thorin and Company empty-handed. So he stood and hesitated in the shadows. Of the various burglarious proceedings he had heard of picking the trolls' pockets

seemed the least difficult, so at last he crept behind a tree just behind William.

Bert and Tom went off to the barrel. William was having another drink. Then Bilbo plucked up courage and put his little hand in William's enormous pocket. There was a purse in it, as big as a bag to Bilbo. "Ha!" thought he, warming to his new work as he lifted it carefully out, "this is a beginning!"

It was! Trolls' purses are the mischief, and this was no exception. "'Ere, 'oo are you?" it squeaked, as it left the pocket; and William turned round at once and grabbed Bilbo by the neck, before he could duck behind the tree. "Blimey, Bert, look what I've copped!" said William.

"What is it?" said the others coming up. "Lumme, if I knows! What are yer?"

"Bilbo Baggins, a bur — a hobbit," said poor Bilbo, shaking all over, and wondering how to make owl-noises before they throttled him.

"A burrahobbit?" said they a bit startled. Trolls are slow in the uptake, and mighty suspicious about anything new to them.

"What's a burrahobbit got to do with my pocket, anyways?" said William.

"And can yer cook 'em?" said Tom.

"Yer can try," said Bert, picking up a skewer.

"He wouldn't make above a mouthful," said William, who had already had a fine supper, "not when he was skinned and boned."

"P'raps there are more like him round about, and we might make a pie," said Bert. "Here you, are there any more of your sort a-sneakin' in these here woods, yer nassty little rabbit," said he looking at the hobbit's furry feet; and he picked him up by the toes and shook him.

1) What is the skill that hobbits are proud of having?

    A) Their superior magic powers.
    B) Their ability to walk without any noise.
    C) Their ability to see in the dark.

2) What food were the trolls dreaming about?

    A) Mutton.   B) Humans' meat.   C) Roasted pony.

3) What were the options that Bilbo had when he saw the trolls?

    A) To tell his friends about the danger or to steal something.

    B) To walk away quietly to his friends or to tell them about the danger.

    C) To walk away quietly to his friends or to ride a pony.

4) Why was Bilbo caught by the trolls?

    A) He tried to steal a magic speaking object.

    B) There was a mischief pocket that Bilbo stole.

    C) His head and neck were seen after he had hid behind the tree.

5) What does Bert suggest at the end of this extract?

    A) There are more little hobbits hiding in the forest.

    B) Bilbo has a pie and he can feed the trolls.

    C) The trolls can catch little rabbits with Bilbo's help and make a pie.

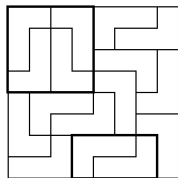**20.40.** Choose one of the following quotes and write an essay (100–250 words) giving your opinion on it:

A) "There is only one corner of the universe you can be certain of improving, and that's your own self." *Aldous Huxley*

B) "Honesty is the first chapter in the book of wisdom." *Thomas Jefferson*

C) "The secret of getting ahead is getting started." *Mark Twain*

D) "Life's most persistent and urgent question is, «What are you doing for others?»" *Martin Luther King, Jr.*

E) "Today you are you! That is truer than true! There is no one alive who is you-er than you!" *Dr. Seuss*

Математика
Отборочный этап

5 класс

20.41. На рисунке показан квадрат 8×8, разрезанный на L-тетрамино (четырёхклеточные фигурки в форме буквы L). При этом некоторые из них образуют меньшие прямоугольники (два таких прямоугольника выделены на рисунке). Можно ли разрезать квадрат 8×8 на L-тетрамино таким образом, чтобы меньшие прямоугольники не образовывались? (*А. А. Теслер*)
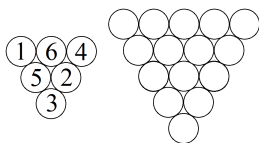
20.42. Петя пишет поэму. В первый день он написал первые несколько строк, а в каждый следующий день дописывал на одну строку больше, чем дописал в предыдущий день (например, если в первый день он придумал 3 строки, то в конце второго дня поэма содержала 7 строк, а в конце третьего — 12).

Пункт А. Может ли в конце какого-то дня (не первого) количество строк в поэме оканчиваться цифрой 4?

Пункт Б. Может ли в конце какого-то дня (не первого) количество строк в поэме оканчиваться цифрой 4, а в конце какого-то из следующих дней — цифрой 7? (*И. М. Туманова*)
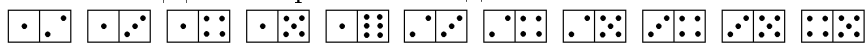
20.43. Назовём расположение чисел *милым*, если каждое число равно разности двух, стоящих над ним. Например, на рисунке слева показано милое расположение чисел от 1 до 6. Придумайте

милое расположение чисел от 1 до 15 (каждое из них должно использоваться ровно один раз, образуя фигуру, нарисованную справа). *(А. Р. Араб)*

20.44. Петя и Вася играют в следующую игру. У них есть шоколадка 2019 × 2020 клеток, и каждым ходом игрок отламывает от неё прямоугольный кусок и съедает его (в результате остаётся тоже прямоугольник, состоящий из клеток, но меньшего размера). Начинает игру Петя, далее ходят по очереди. Побеждает тот, после чьего хода периметр шоколадки станет ровно 10. Кто из игроков может выиграть при любой игре соперника? Как ему надо для этого действовать? *(О. А. Пяйве)*

20.45. Дан набор костяшек домино:

Пункт А. Можно ли составить из них всех цепочку по правилам домино?

Пункт Б. Можно ли убрать одну костяшку из набора так, чтобы из всех остальных нельзя было сделать цепочку? *(А. А. Теслер)*

20.46. На одном острове живут четыре типа людей: рыцари (не могут произносить ложных утверждений), лжецы (не могут произносить истинных утверждений), обычные люди (могут говорить всё что угодно) и бояки (не делают вообще никаких утверждений). Однажды собрались несколько человек, и каждый из них произнёс одну из следующих фраз: «Кто вы?», «Я рыцарь», «Я лжец», «Я обычный», «Я бояка». Каждую фразу произнесли ровно по 10 человек. Могут ли рыцари оказаться самым многочисленным типом людей в этой компании? *(А. А. Теслер)*

20.47.   Даны три сосуда. Первый сосуд наполнен водой, а второй и третий — пусты. В 12:00 из первого сосуда начинает литься вода во второй и третий, причём во второй поступает 2 литра в минуту, а в третий — 4 литра в минуту. В 13:00 объём воды в первом и втором сосудах сравнялся. Во сколько первый сосуд опустеет?   (*А. А. Теслер*)

6 класс

20.48.   *Смотри задачу* **20.41**.

20.49.   *Смотри задачу* **20.42**.

20.50.   *Смотри задачу* **20.43**.

20.51.   *Смотри задачу* **20.44**.

20.52.   *Смотри задачу* **20.45**.

20.53.   *Смотри задачу* **20.46**.

20.54.   В магазине есть три сорта чая: зелёный, чёрный и фруктовый. Вначале количество пачек разных сортов относилось как $4:5:8$. После недели продаж и новой поставки это соотношение изменилось и стало $5:7:12$. Известно, что число пачек фруктового чая возросло на 60%, а зелёного увеличилось не более чем на 20 пачек. Сколько всего пачек чая было в магазине вначале?   (*Л. С. Корешкова*)

7 класс

20.55.   *Смотри задачу* **20.41**.

20.56.   *Смотри задачу* **20.42**.

20.57.   *Смотри задачу* **20.43**.

20.58.   *Смотри задачу* **20.54**.

20.59. Имеется два резервуара, каждый из которых вмещает 2020 м³ воды. В полночь в первом резервуаре 100 м³ воды, а второй заполнен целиком. В первый резервуар каждый час поступает 110 м³ воды (пока он не заполнится), а из второго каждый час выкачивают 50 м³ (пока он не опустеет). В какие моменты времени разница между объёмами воды в резервуарах будет составлять половину первоначальной?

(И. Ж. Ибатулин)

20.60. У Гарри Поттера есть коробка размерами $10 \times 10 \times 10$ сантиметров и волшебный аппарат. Если поместить коробку в аппарат, то одно из её измерений (длина, ширина или высота) увеличивается на 50%, а каждое из двух других уменьшается на 20%. Может ли у Гарри после нескольких применений аппарата получиться коробка $20 \times 20 \times 20$ сантиметров? *(А. А. Теслер)*

20.61. На одном острове живут четыре типа людей: рыцари (не могут произносить ложных утверждений), лжецы (не могут произносить истинных утверждений), обычные люди (могут говорить всё что угодно) и бояки (не делают вообще никаких утверждений). Однажды собрались несколько человек, и каждый из них сказал одну из следующих фраз: «Кто вы?», «Я рыцарь», «Я лжец», «Я обычный», «Я бояка». Каждую фразу произнесли ровно по 6 человек. Известно, что людей всех типов было разное и ненулевое количество. Больше всего было рыцарей. А сколько именно (найдите все возможные варианты ответа на этот вопрос и докажите, что других нет)? *(А. А. Теслер)*

8 класс

20.62. *Смотри задачу* **20.41**.

20.63. *Смотри задачу* **20.54**.

20.64. Два хакера создали разные программы для анализа степени изменения чисел при некоторых действиях.
Первая программа за один цикл умножает любое натуральное число на 3, а затем отнимает от результата его сумму цифр; далее с новым результатом повторяется 7 таких же циклов. Итоговый результат работы программы первого хакера — отношение полученного результата к исходному числу.

Программа второго хакера берёт число, состоящее только из девяток, и за один цикл делит это число на сумму цифр, если оно делится, а в противном случае отнимает сумму цифр; далее с результатом повторяются 7 таких же циклов. Итоговый результат работы программы второго хакера — отношение исходного числа к полученному результату.

Хакеры решили сыграть в игру: каждый придумывает себе изначальное число; у кого итоговый результат больше, тот и победил. Кто из хакеров сумеет победить при любой игре соперника? (*И. Ж. Ибатулин*)

20.65. *Смотри задачу* **20.59**.

20.66. ABC и CDE — равнобедренные прямоугольные треугольники с гипотенузами $BC = 7$ и $CE = 14$. C лежит на отрезке BE, а точки A и D лежат по одну сторону от прямой BE. Отрезки AE и BD пересекаются в точке O. Найдите площадь треугольника ODE. (*А. Р. Араб*)

20.67. *Смотри задачу* **20.61**.

20.68. Стол имеет форму квадрата со стороной 1 метр. На нём лежат, не накладываясь, 12 монет радиуса 1 см. Докажите, что можно выбрать 4 различные монеты с центрами A, B, C, D таким образом, что $1 \leqslant CD : AB < 1{,}1$ или $1 \leqslant AC : AB < 1{,}1$. (*А. А. Теслер*)

9 класс

20.69. *Смотри задачу* **20.54**.

20.70. *Смотри задачу* **20.45**.

20.71. *Смотри задачу* **20.59**.

20.72. В окружность диаметра 5 вписан треугольник, все стороны которого имеют целые длины. Найдите его периметр (укажите все возможные варианты и докажите, что других нет). (*П. Д. Муленко*)

20.73. Существуют ли такие различные натуральные числа a, b, x и y, что x записывается в системе счисления с основанием a точно так же, как y записывается в системе счисления с основанием b, и наоборот (x записывается в системе счисления с основанием b точно так же, как y записывается в системе счисления с основанием a)? (*В. П. Федотов*)

20.74. *Смотри задачу* **20.68**.

20.75. Пусть a и b — два вещественных числа, причём
$$2a^3 + 2b^3 + 3a^2b + 3ab^2 + 60ab = 16000.$$
Найдите все возможные значения $a + b$. (*А. Р. Араб*)

10–11 классы

20.76. *Смотри задачу* **20.45**.

20.77. В треугольнике ABC со сторонами $AB = 6$, $BC = 4$, $AC = 8$ на стороне AC отмечена такая точка M, что вписанные окружности треугольников ABM и BCM имеют общую точку. Найдите отношение площадей этих треугольников. (*Л. С. Корешкова*)

20.78. *Смотри задачу* **20.61**.

20.79. Поверхность деревянного куба с ребром 1 метр покрашена краской. От каждого его угла отпилили пирамиду, в результате остался 14-гранник, все покрашенные грани которого — прямоугольники, а все непокрашенные — правильные треугольники (не обязательно одинаковые). Найдите общую площадь окрашенной поверхности этого 14-гранника, если она в $\sqrt{3}$ раз меньше, чем общая площадь его неокрашенной поверхности. *(А. А. Теслер)*

20.80. По команде k роботы Девяткин и Десяткин выписывают все натуральные числа от 1 до $37k$. Затем Девяткин ищет среди них число, в десятичной записи которого больше всего цифр 9, а Десяткин — число с наибольшим количеством нулей. Если у кого-то из них нужных цифр окажется больше, то ему присуждают очко. С каким счётом закончится матч, если он состоит из последовательного исполнения команд k...

Пункт А. ...для k от 1 до 2019,
Пункт Б. ...для k от 1 до 10^{2019}?

(В. П. Федотов)

20.81. Можно ли вместо пропусков поставить семь последовательных натуральных чисел (в каком-то порядке) так, чтобы равенство

$$(x - \_)(x - \_)(x - \_) = (x - \_)(x - \_)(x - \_) + \_$$

выполнялось при всех x? *(А. А. Теслер)*

20.82. Имеются три бассейна. Из первого с постоянной скоростью выливается вода, а во второй и третий бассейны вода поступает с постоянными скоростями. Изначально в первом бассейне было столько же воды, сколько в двух других в сумме; через некоторое время во втором бассейне стало столько же воды, сколько в двух других в сумме; ещё через какое-то время в третьем бассейне стало столько же

воды, сколько в первых двух в сумме. Возможно ли, что ни в начале, ни в конце этого промежутка времени ни один из бассейнов не был пустым? *(А. А. Теслер)*

Заключительный этап

5 класс

20.83. Можно ли разместить в квадрате 3×3 числа от 1 до 9 (каждое по одному разу) так, чтобы число в каждой угловой клетке было хотя бы на 4 больше, чем каждое из его соседей? Числа называются соседями, если у клеток, в которых они стоят, есть общая сторона.

(А. Р. Араб, А. А. Теслер)

20.84. Если из прямоугольника на клетчатой бумаге вырезали (тоже по клеткам) прямоугольник, один (и только один) из углов которого совпадает с каким-то из углов исходного, то фигуру, оставшуюся после такого вырезания, будем называть Г-образной. Квадрат какого наименьшего размера можно разрезать на Г-образные фигуры? *(В. П. Федотов)*

20.85. Двое играют в игру. Первый игрок пишет на пустой доске произвольное натуральное число, не кратное 10. Дальше игроки по очереди (начиная со второго) пишут на доске какую-нибудь степень любого из чисел, написанного на доске. (Например, если на доске написаны числа 3 и 81, то можно написать любое из чисел $3 = 3^1$, $9 = 3^2$, $27 = 3^3$, $81 = 3^4$, $243 = 3^5$ и так далее, а также $81 = 81^1$, $6561 = 81^2$ и так далее) Выигрывает тот из игроков, после хода которого сумма каких-нибудь чисел, написанных на доске, делится на 10. У кого из игроков есть способ выиграть при любой игре соперника? Как он должен действовать?

(И. М. Туманова, А. А. Теслер)

20.86. Квадрат со стороной 12 см разрезали на три прямоугольника одинакового периметра. Чему же равен этот периметр? (*А. А. Теслер*)

20.87. Экран калькулятора изначально выглядел так, как на рисунке справа.
Но потом некоторые палочки на нём перегорели. Поэтому получилось, что $275 \times 9 = 1279$:

Восстановите, что вводили на самом деле и какое число получилось (найдите все возможные варианты и объясните, почему никаких других быть не может). (*П. Д. Муленко*)

20.88. У каждой из двух сестёр в кармане от 1 до 7 конфет. Папа может задать любой из них вопрос, на который она ответит «да» или «нет». Он хочет, задав не более 4 вопросов, выяснить, верно ли, что вместе у них больше 7 конфет. Придумайте, как ему это сделать.

Замечание. Каждый вопрос задаётся только одной из сестёр. Ни одна из сестёр не знает, сколько конфет в кармане у другой, поэтому каждую сестру можно спрашивать только о её конфетах. (*А. А. Теслер*)

6 класс

20.89. *Смотри задачу* **20.84**.

20.90. Полина написала восемь последовательных натуральных чисел и обвела четыре из них чёрной ручкой, а четыре — красной. Может ли произведение красных чисел оказаться в 20 раз больше произведения чёрных?

(*П. Д. Муленко*)

20.91. *Смотри задачу* **20.85**.

20.92. Сколькими способами можно разместить в квадрате 3×3 числа от 1 до 9 (каждое по одному разу) так, чтобы число в каждой угловой клетке было хотя бы на 4 больше, чем каждое из его соседей? Числа называются соседями, если у клеток, в которых они стоят, есть общая сторона. Способы, переводимые друг в друга симметрией или поворотом, считаются разными. (*А. Р. Араб, А. А. Теслер*)

20.93. *Смотри задачу* **20.87**.

20.94. На одной конференции встретились известный учёный Франсуа и трое его не менее известных друзей: Карл, Рене и Леонард.
Франсуа, помимо своих научных достижений, известен ещё и тем, что является отцом нескольких детей, которые все родились в разные годы, но все в одну и ту же дату. Друзья поинтересовались, сколько лет каждому из детей, на что Франсуа дал им задачку. «Произведение возрастов моих детей, — сказал он, — как раз равно сумме дня и месяца их рождения. Сейчас я сообщу Карлу количество моих детей, Рене — месяц рождения, а Леонарду — день рождения, и попробуйте угадать, сколько им лет». После этого он шепнул на ухо друзьям указанную информацию.
Немного подумав, Карл воскликнул, что он точно знает возраст двоих детей Франсуа. «Ну тогда мы все понимаем, сколько детей, и сколько лет двум из них. Но я всё ещё не могу понять возраст остальных», — ответил Леонард. Рене тут же заметил*: «А вот мне известен возраст всех детей, кроме самого старшего». После этого Леонард заключил, что теперь ему и, следовательно, всем троим точно известны возрасты

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*Формулировка «Рене тут же заметил» оказалась двусмысленной; правильно её трактовать как «Рене, не успев обдумать фразу Леонарда, сказал».

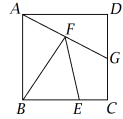всех детей. Сколько же у Франсуа детей и сколько лет каждому из них? *(П. Д. Муленко)*

7 класс

20.95. *Смотри задачу* **20.84**.

20.96. Найдутся ли три натуральных числа, больших 1, произведение которых равно 500000080000003?

(А. А. Теслер)

20.97. *Смотри задачу* **20.90**.

20.98. Квадрат разрезан на четыре части равной площади, как показано на рисунке. Найдите отношение $BE : EC$. *(А. Р. Араб)*
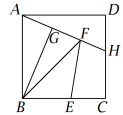
20.99. *Смотри задачу* **20.94**.

20.100. Шахматный конь проскакал по доске 3×4, причём на первой клетке своего пути написал число n, на второй — число $n + 1$, ..., на последней — $n + 11$. Могло ли оказаться, что сумма чисел в каждой строке кратна трём и сумма чисел в каждом столбце кратна трём? *(Л. С. Корешкова)*
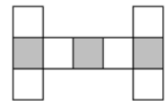
8 класс

20.101. *Смотри задачу* **20.90**.

20.102. Квадрат разрезан на пять частей равной площади, как показано на рисунке. Найдите отношение $BE : EC$. *(А. Р. Араб)*

20.103. Сколькими способами можно разместить в фигуре на рисунке числа от 1 до 9 (каждое по одному разу) так, чтобы число в каждой

закрашенной клетке было хотя бы на 2 больше, чем каждое из его соседей? Способы, переводимые друг в друга симметрией или поворотом, считаются разными.   (А. Р. Араб)

20.104. На доске написано число 2. Двое играют в игру, делая ходы по очереди: каждый из игроков своим ходом может написать на доске любую степень двойки (то есть число вида $2^k, k \geqslant 1$). Игрок, после хода которого на доске появятся две одинаковые цифры, проигрывает. У кого из игроков (у того, кто начинает, или у его соперника) есть способ выиграть при любой игре другого? Как он должен действовать?

(И. М. Туманова, А. А. Теслер)

20.105. Докажите, что число $n^{24} - n^4 + n^2 - n^{22}$ делится на 720 при любом нечётном n.   (И. М. Туманова)
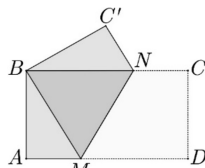
20.106. *Смотри задачу* **20.100**.

9 класс

20.107. *Смотри задачу* **20.86**.

20.108. Прямоугольник $ABCD$ сложили вдоль линии MN так, что точки B и D совпали. Оказалось, что $AD = AC'$. Найдите соотношение сторон прямоугольника.

(П. Д. Муленко)

20.109. Произведение положительных чисел x, y, z, t равно 1. Докажите, что если

$$x + y + z + t > \frac{x}{y} + \frac{y}{z} + \frac{z}{t} + \frac{t}{x},$$

то

$$x + y + z + t < \frac{y}{x} + \frac{z}{y} + \frac{t}{z} + \frac{x}{t}.$$

(А. Р. Араб)

20.110. *Смотри задачу* **20.94**.

20.111. У каждой из двух сестёр в кармане от 1 до 1000 конфет. Папа по очереди задаёт сёстрам (то одной, то другой) вопросы, на которые можно ответить «да» или «нет». Он хочет, задав не более чем по 6 вопросов каждой из сестёр, выяснить, верно ли, что вместе у них больше 1000 конфет. При этом ни одна из девочек не знает, сколько конфет в кармане у другой, поэтому каждую сестру можно спрашивать только о её конфетах. Придумайте, как папе добиться цели.

<div align="right">(А. А. Теслер)</div>

20.112. При каком наибольшем натуральном числе n множество $\{2, 3, 4, \ldots, n\}$ можно так покрасить в синий и красный цвета, чтобы произведение двух любых (в том числе одинаковых) чисел одного цвета имело другой цвет?

<div align="right">(А. Р. Араб)</div>

10 класс

20.113. *Смотри задачу* **20.104**.

20.114. *Смотри задачу* **20.108**.

20.115. *Смотри задачу* **20.109**.

20.116. При каком наибольшем натуральном числе n множество $\{3, 4, 5, \ldots, n\}$ можно так покрасить в синий и красный цвета, чтобы произведение двух любых (в том числе одинаковых) чисел одного цвета имело другой цвет?

<div align="right">(А. Р. Араб)</div>

20.117. *Смотри задачу* **20.111**.

20.118. Про вещественные числа m, n, x, y известно следующее:

$$\begin{cases} mx + ny = 4, \\ mx^2 + ny^2 = 2, \\ mx^3 + ny^3 = 6, \\ mx^4 + ny^4 = 38. \end{cases}$$

Чему равно $\big((m+n)(x+y) + 5xy\big)(m+n+x+y)$?

(П. Д. Муленко)

11 класс

20.119. *Смотри задачу* **20.108**.

20.120. Юлианский календарь устроен так: каждый год с номером, кратным 4 — високосный; в обычном году 365 дней, а в високосном — на 1 больше; кроме этого, есть семидневная неделя. В результате существуют 14 видов года: невисокосный год, начинающийся в понедельник, во вторник, ..., в воскресенье; високосный год, начинающийся в понедельник, во вторник, ..., в воскресенье.

Когда земляне поселились на планете Ялмез, то ввели календарь, в котором каждый год с номером, кратным v ($v > 1$) — високосный; в обычном году x дней, а в високосном — на 1 больше; неделя по-прежнему состоит из 7 дней. Оказалось, что в таком календаре ровно n видов года. Найдите все возможные значения n.

(А. А. Теслер)

20.121. В противоположных углах шахматной доски стоят Красная и Белая Королевы. Раз в минуту они случайным образом переходят на соседнюю по стороне клетку (одна только вправо или вверх, другая только влево или вниз). Какова вероятность, что они одновременно окажутся в одной клетке (и будут стоять там вместе в течение минуты)?

(П. Д. Муленко)

20.122. Каждая из двух сестёр загадала натуральное число от 1 до 1000. Папа по очереди задаёт сёстрам (то одной, то другой) вопросы, на которые можно ответить «да» или «нет». Он хочет, задав не более чем по 6 вопросов каждой из сестёр, выяснить, верно ли, что загаданные числа различаются более чем на 500. При этом ни одна из девочек не знает, что загадала другая, поэтому каждую сестру можно спрашивать только о её числе. Придумайте, как папе добиться цели.

(А. А. Теслер)

20.123. *Смотри задачу* **20.112**.

20.124. *Смотри задачу* **20.118**.