MATHEMATICS

The purpose of this document is to outline the knowledge and skills tested in the SSE Riga Admissions Test Mathematics part.

Answer

1. **Find** $1 - 2(5 - 7)(-3) + 3$ | *-8*

2. **Find** $\dfrac{1}{10}\left(\dfrac{1}{7} - \left(\dfrac{1}{3}\right)\left(\dfrac{1}{4}\right)\right)$ | $\dfrac{225}{16}$

3. **Find** $16^{\frac{3}{4}}$ | 8

4. **Simplify** $\dfrac{1}{\sqrt{3+1}} + \dfrac{1}{2}$ | 1

5. **Simplify** $(4x^4)^4 - (x^2)^8$ | *255x¹⁶*

6. **Simplify** $\dfrac{1}{3}\sqrt{18} + 5\sqrt{8} + 0{,}6\sqrt{50}$ | $14\sqrt{2}$

7. **Factorize** $x^2 + 3x - 28$ | $(x+7)(x-4)$

8. **Factorize** $x^4 - y^4$ | $(x-y)(x+y)(x^2+y^2)$

9. A line L passes through the point (1,1) and has a slope of 4. A second line M passes through (-1,2) and (3,-1). Find their point of intersection P. | $P{:}\left(\dfrac{13}{15}; \dfrac{3}{5}\right)$

10. **Solve the equation** $ln(x^2 - 1) - ln(2x - 1) + ln(2) = 0$ | $\dfrac{1+\sqrt{3}}{2}$

LOGICAL APTITUDE

The logical aptitude part of the admissions exam strives to asses logical reasoning of the applicant. The aim is to test applicant's numerical reasoning and general intelligence by using such tests as number series and quantitative estimations, as well as non-verbal reasoning test. Applicants can use the Internet recourses to prepare for this part of the admissions tests.

Example Question I

Identify the missing number in the series.

	A	B	C	D	E
1. 4, 8, 16, 32, ?	48	64	40	46	44
2. 3, 6, 11, 18, ?	30	22	27	29	31
3. 4,3,5,9,12,17?	32	30	24	26	22

Answers

1. B – The numbers double each time
2. C – The interval, beginning with 3, increases by 2 each time
3. D – Each number is the sum of the previous and the number 3 places to the left

To solve these number sequence questions efficiently, you should first check the relationship between the numbers themselves looking for some simple arithmetic relationship. Then look at the <u>intervals</u> between the numbers and see if there is a relationship there. If not, and particularly if there are more than 4 numbers visible, then there may be two number sequences interleaved. You will occasionally find multiplication, division, or powers used in these sequences, but test designers tend to avoid them as these operations soon lead to large numbers which are difficult to work out without a calculator.

Example Question II

You need to estimate the answers to these questions, as you do not have time to calculate them precisely.

|	A	B	C	D	E
1. 347+198=	650	550	580	590	600
2. 69x70=	490	4650	5000	4800	4600
3. 905÷49=	18	14	13	15	12

Answers

1. B
2. D
3. A

Even though numerical estimation questions appear straightforward, it can take some time to develop the optimum compromise between speed and accuracy. Before you attempt to answer each question, look at the range of answers available and ask yourself how accurate your estimate needs to be. For example, is an order of magnitude sufficient or does the answer need to be worked out to the nearest whole number?

If you are out of practice with arithmetic, then try re-learning the times tables up to 12 and practice rough and ready multiplication, division and percentage calculations. Practice can improve your test scores for all types of aptitude tests but numerical estimation is one area where it can really make a difference, so try as many examples as you can.

Example Question III
Which two pictures are identical?

A   B   C   D   E
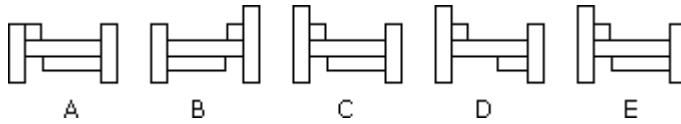
Answer
C and E are the only two pictures which are identical

The best strategy for these types of question is to begin with the shape on the left and work through the shapes to the right of it systematically looking for an exact match. If there isn't one then move on to the second shape and repeat the process. It can be quite difficult to discipline yourself to adopt this systematic approach to these types of question, as you may think that it is quicker just to look at all of the shapes until the answer' jumps out' at you. The problem with this is that if the answer doesn't 'jump out' fairly quickly then panic sets in and you usually resort to the systematic approach anyway.

Admissions exam: English language

The English language part of the admissions exam is divided into three areas: 1) reading comprehension, 2) grammar, and 3) written assignment. In the reading comprehension part, applicants could be given a recent news report from a major English-language newspaper or magazine and then asked e.g. ten multiple choice questions about its content. An example news report can be found below:

The Fake News Crisis

(1) Nowadays, a typical news session begins with us logging on to our preferred social media websites, which we increasingly rely on as mediums to interpret and disseminate information. Consequently, tech giants such as Facebook and Twitter have come under close scrutiny for the ways they mediate and censor these discussions. In particular, they have been accused of providing a safe house for "fake news"—online content rife with misinformation.

(2) A recent troubling MIT study revealed that "fake news" diffused significantly farther, faster, deeper and more broadly than accurate stories, with the effect even more pronounced when regarding political news as opposed to reporting on natural disasters, finance or science. More worrisome, contrary to the perception that the fake news epidemic is a conception of malicious online news-bots, there is evidence that suggests the public actually craves fake news. The study found that online bots were equally likely to propagate both false and truthful information, implying that the fake news epidemic exists because humans, not internet bots, are fueling it by favoring misinformation. This might have something to do with human nature. Twitter users seem almost to prefer sharing falsehoods—these were 70 percent more likely to get retweeted than accurate news.

(3) Most of our knowledge about the world is secondhand knowledge—after all, we can't each do all of our own scientific research. Making a factual claim in person, even if you are merely passing on news you picked up elsewhere, means taking on the responsibility for it, and putting your reputation at risk. Part of the reason that people believe you when you share information is that they have determined your credibility and can hold you accountable if you are lying or if you're wrong. The reliability of secondhand knowledge comes from these norms. But social media has weird norms. As the informal Twitter slogan goes, "A retweet is not an endorsement." When Donald Trump was caught retweeting fake statistics about race and crime, he told Fox News it wasn't a big deal: "Am I gonna check every statistic? All it was is a retweet. It wasn't from me." On a rational level, we know that people pass along news on social media without verifying its accuracy all the time, but many of us listen to them anyway.

(4) The information people share is often too tempting to ignore, especially when it reaffirms our existing beliefs. Psychologists have speculated that this phenomenon can be explained by humans' inherent need to harmonize their observations with their existing view of the world—a need to avoid what's known as cognitive dissonance. Psychologist Mark Whitmore explains that

"the brain is hardwired to accept, reject, misremember or distort information based on whether it is viewed as accepting of or threatening to existing beliefs." As a result, instead of gravitating towards accurate, rigorously verified news content, we have developed a diet for self-validating sensationalism, and the social media sector is happy to oblige our tastes.

(5) The MIT team suggests that falsehood does so well because, first, fake news seems to be more "novel" than real news. "False information online is often really novel and frequently negative, and we're attentive to novel threats and especially negative threats," adds Brendan Nyhan, a Dartmouth professor. Second, fake news evokes much more emotion than the average tweet: fake tweets tended to elicit words associated with surprise and disgust, the MIT team found. "Content that arouses strong emotions spreads further and faster on Twitter, consistent with research in psychology and communication studies," explains Rebekah Tromble, a political scientist. Thus, on platforms where every user is at once a reader, a writer, and a publisher, falsehoods are too seductive: the thrill of novelty is too alluring, the titillation of disgust too difficult to transcend.

(6) The danger of online misinformation is clear—for example, a recent study revealed that one in four Americans visited a fake news website before the election, and such sources may have played a substantial role in shaping the elections and manipulating voter turnout. So how can we fight fake news? Leading scholars have suggested that a potential solution could be using early education to help individuals recognize these psychological pitfalls and apply critical thinking to the information they consume. Incorporating internet information classes into the primary and secondary school curriculum to make fact-checking seem like second nature to individuals at an early age would make them less vulnerable to agenda-driven information sources throughout their lives. One recent study involving 15–27 year olds revealed that media-literacy training made individuals less likely to believe a demonstrably false claim, even when the statement was aligned with their existing political point of view; thus, a school curriculum that teaches how to properly consume and disseminate online information would be potentially beneficial.

(7) It is also true that technology spawned the problem of fake news, and it is tempting to think that technology can solve it. Currently, Facebook asks independent fact-checking organizations from across the political spectrum to identify false information. Whenever users try to post something that has been identified as fake news, they are confronted by a pop-up that asks them to confirm if they'd like to continue. None of these users are prevented from posting stories whose facts are in dispute, but they are required to know that what they are sharing may be false or misleading. Similarly, Facebook could display a simple reliability marker on every post; people might glance at the reliability marker before nodding along with a friend's provocative post or think twice before passing on a weird story from a friend. As of now, it is still unclear which interventions—just clever programming or each of us taking up our responsibilities as digital citizens—could reverse the tendency toward falsehood that dominates social platforms.

Here are three questions which could be asked about this article:

1. The concern expressed by the author is that
    a) false information outperforms true information on social media.
    b) people do not take responsibility for the information they disseminate.
    c) technology has given rise to an age of misinformation.
    d) all of the above.

2. According to Paragraph 2, online news-bots
    a) surpass people in spreading fake news.
    b) help filter out malicious content.
    c) typically get the blame for promulgating falsehoods.
    d) contribute to the overabundance of information.

3. The purpose of Paragraph 3 is
    a) to justify the existence of fake news.
    b) to contrast spreading news online versus in person.
    c) to provide reasons why Twitter should be banned.
    d) to introduce the concept of freedom of expression.

The correct answer to the first question is **d.**
The correct answer to the second question is **c.**
The correct answer to the third question is **b.**

The grammar section could pose some multiple questions on verb and article usage. Here is a probable question on the former:

1. One of these sentences contains a mistake in verb usage. Indicate the letter of the incorrect sentence:
    a. At the moment prices increase.
    b. Prices were increasing throughout 2009.
    c. Recently prices have increased.
    d. Recently prices have been increasing.

The correct answer is **a.** Using the present simple is incorrect here because the phrase "at the moment" implies a temporary process happening as we speak; the present continuous is needed: "At the moment prices are increasing." The present simple, meanwhile, could be used to refer to something that increases regularly: "Consumption increases every fall."

Regarding articles, applicants are given sentences with blank spaces and asked whether the spaces should be filled with 'a', 'an', 'the' or left blank. For instance:

1. Croatia will join_____European Union.
2. Slovenia is_____European Union member.

The first sentence requires **'the'** since the European Union is a unique institution. The second sentence requires **'a'** since 'European Union' is being used as an adjective and the article must modify the noun, 'member', which does not designate anything unique here (there are many members of the European Union). Meanwhile, though the word directly following the article – 'European' – begins with a vowel, a consonant sound is created, so 'a', not 'an', is needed.

Written Assignment

The written assignment may or may not be based on the article, and it may include on or several of the following tasks:

- Summarize
- Paraphrase
- Provide arguments in favor or against a position (e.g. find three arguments)