Revision test and exam practice JAM04

1. **Listening: Euclid's puzzling parallel postulate**
   https://www.youtube.com/watch?v=LPET_HhN0VM

1. Euclid's Elements contain	....
2. Euclid built up his system of proof with definitions, common notions, and his	
3. Parallel postulate is different from other postulates because	
4. Many mathematicians tried to prove this postulate from	
5. Mathematicians like Gauss or Lobachevsky asked the question: what would happen logically if this postulate	
6. The main difference between Euclidean and non-Euclidean geometry depends on	
7. Alternative geometries were found to be able to describe	
8. Progressive, gifted thinkers like Euclid were able to suspend their	

2. **Vocabulary – put the words in the gaps. Some of them are not needed.**
   space time motion acceleration variables equations solved modelled velocity derivatives gravity

A **differential equation** is a mathematical equation for an unknown function of one or several a) .... that relates the values of the function itself and its derivatives of various orders.

Differential equations arise in many areas of science and technology: whenever a deterministic relationship involving some continuously varying quantities b) .... by functions and their rates of change in c)........... and/or time (expressed as derivatives) is known or postulated. This is illustrated in classical mechanics, where the d)........... of a body is described by its position and e)............ as the time varies. Newton's Laws allow one to relate the position, velocity, f)............ and various forces acting on the body and state this relation as a differential equation for the unknown position of the body as a function of g).......... In some cases, this differential equation (called an equation of motion) may be h).......... explicitly.

3. **Questions – ask about underlined part of sentences. Then form indirect questions.**

1) The graphs are composed of <u>nods (vertices) and edges.</u>
2) The worst case running time for any algorithm for TSP increases <u>exponentially</u> with the number of cities.
3) <u>Additional constraints such as limited resources</u> make the problem considerably harder.
4) <u>At least since the Renaissance,</u> many artists and architects have proportioned their works to approximate the golden ratio.

4. **Connectors**

1) **….**they tried hard, the students could not complete the presentation in time as they were lacking in skills and knowledge.
   A Although   B As   C Since   D Despite   E However

2) Smaller companies were merged into the parent company….creating a single organization.
   A despite   B as a consequence   C though   D in order to   E thereby

3) Grigori Perelman refused to except the Fields Medal ………. the consequences he faced.
   A although B much as   C as a result D regardless of   E since

5. **Word formation – use a different form of the word in brackets to complete the sentence.**

   1) The ………………………form of plagiarism was introduced into English around 1620. (derivation)
   2) It may form part of a claim for ……… of the contract. (to break)
   3) Mathematicians have known that the sphere is the only three- ……………..space with this property. (dimension)
   4) Is there any situation in which the law of diminishing marginal …….. may not hold true? (to utilize)

6. **Transformations**
   1. The proof of the conjecture has eluded mathematicians.
      Mathematicians ………………………… the proof of the conjecture.

   2. Mathematicians have studies the golden ratio because of its unique and interesting properties.
      The unique and interesting properties …………………………………………………

   3. It is very difficult to measure degrees of connectivity using algebraic constructs.
      Degrees of connectivity …………………………………………………………

   4. If you buy more products of the same kind, you regard them as less valuable.
      The more products of the same kind……………………………………………..

7. **Synonyms**

The problem was first formulated as a mathematical problem in 1930 and is one of the most intensively studied problems in optimization. It is used as a benchmark for many optimization methods. Even though the problem is computationally difficult, a large number of heuristics and exact methods are known, so that some instances with tens of thousands of cities can be solved.

The TSP has several applications even in its purest formulation, such as planning, logistics, and the manufacture of microchips. Slightly modified, it appears as a sub-problem in many areas, such as DNA sequencing. In these applications, the concept *city* represents, for example, customers, soldering points, or DNA fragments, and the concept *distance* represents travelling times or cost, or a similarity measure between DNA fragments. In many applications, additional constraints such as limited resources or time windows make the problem considerably harder.

a) model
b) practical, based on experience   d) parts of something
c) cases, examples   e) obstacles, limitations

8. **Logical connections**

In order to be an effective speaker, it is imperative to organize one's ideas and the speech itself into a logical pattern of thoughts. By clearly identifying the key issue or problem, 1) ……………………………………., the speaker will gain the attention and interest and often the approval of their audience. Unprepared speakers usually leave the audience confused and unconvinced of their ideas. Unfortunately the saying often rings true: 2) …………………………, we prepare to fail. In giving our speech 3) ……………………… but physical ones as well. So called body language is a collection of physical movements such as posture, body movements, gestures, facial expression and eye-contact. Research findings indicate 4) ………………………… and that listeners remember ninety percent more of the non-verbal communication. Although it may seem of little comfort when you are seized by stage fright, it should be said 5) ………………………….. and even the best speakers experience it from time to time. So when you know you have done all your homework, stand before the audience, take a deep breath, look them straight in the eyes and 6) ……………………………… and for your audience. If you believe in your message and express yourself in a clear, sincere and enthusiastic manner, you will be able to accept the applause graciously.

A. that nervousness is a natural reaction
B. we are judged not only by verbal signals
C. channel all your energy into enthusiasm for your topic
D. that non-verbal interaction accounts for over half of human communication
E. failing to prepare
F. and then logically leading the listener toward an acceptable solution