EST I – Literacy Test II

Student's Name _____

National ID _____

Test Center: _____

Duration: 65 minutes

52 Multiple Choice Questions

Instructions:

- Place your answer on the answer sheet. Mark only one answer for each of the multiple choice questions.
- Avoid guessing. Your answers should reflect your overall understanding of the subject matter.

The following edited passage is an excerpt from Anna Karenina *by Leo Tolstoy, a historical fiction novel based on Russian high society in the late-19th-century.*

Happy families are all alike; every unhappy family is unhappy in its own way.

Everything was in confusion in the Oblonskys' house. The wife had discovered the husband's deceit, and she had announced to her husband that she could not go on living in the same house with him. This position of affairs had now lasted three days, and not only the husband and wife themselves, but all the members of their family and household, were painfully conscious of it. Every person in the house felt that there was no sense in their living together, and that the stray people brought together by chance in any inn had more in common with one another than they, the members of the family and household of the Oblonskys. The wife did not leave her own room, the husband had not been at home for three days. The children ran wild all over the house; the English governess quarreled with the housekeeper, and wrote to a friend asking her to look out for a new situation for her; the man-cook had walked off the day before just at dinner time; the kitchen-maid, and the coachman had given warning.

Three days after the quarrel, Prince Stepan Arkadyevitch Oblonsky—Stiva, as he was called in the fashionable world—woke up at his usual hour, that is, at eight o'clock in the morning, not in his wife's bedroom, but on the leather-covered sofa in his study. He turned over his stout, well-cared-for person on the springy sofa, as though he would sink into a long sleep again; he vigorously embraced the pillow on the other side and buried his face in it; but all at once he jumped up, sat up on the sofa, and opened his eyes.

"Yes, yes, how was it now?" he thought, going over his reverie. "Now, how was it? To be sure! Alabin was giving a dinner at Darmstadt; no, not Darmstadt, but something American. Yes, but then, Darmstadt was in America. Yes, Alabin was giving a dinner on glass tables, and the tables sang, *Il mio tesoro*—not *Il mio tesoro* though, but something better, and there were some sort of little decanters on the table, and they were women, too," he remembered.

Stepan Arkadyevitch's eyes twinkled gaily, and he pondered with a smile. "Yes, it was nice, very nice. There was a great deal more that was delightful, only there's no putting it into words, or even expressing it in one's thoughts awake." And noticing a gleam of light peeping in beside one of the serge curtains, he cheerfully dropped his feet over the edge of the sofa, and felt about with them for his slippers, a present on his last birthday, worked for him by his wife on gold-colored morocco. And, as he had done every day for the last nine years, he stretched out his hand, without getting up, towards the place where his dressing-gown always hung in his bedroom. And thereupon he suddenly remembered that he was not sleeping in his wife's room, but in his study, and why: the smile vanished from his face, he knitted his brows.

"Ah, ah, ah! Oo!..." he muttered, recalling everything that had happened. And again every detail of his quarrel with his wife was present to his imagination, all the hopelessness of his position, and worst of all, his own fault.

"Yes, she won't forgive me, and she can't forgive me. And the most awful thing about it is that it's all my fault—all my fault, though I'm not to blame.

That's the point of the whole situation," he reflected. "Oh, oh, oh!" he kept repeating in despair, as he remembered the acutely painful sensations caused him by this quarrel.

Most unpleasant of all was the first minute when, on coming, happy and good-humored, from the theater, with a huge pear in his hand for his wife, he had not found his wife in the drawing-room, to his surprise had not found her in the study either, and saw her at last in her bedroom with the unlucky letter that revealed everything in her hand.

She, his Dolly, forever fussing and worrying over household details, and limited in her ideas, as he considered, was sitting perfectly still with the letter in her hand, looking at him with an expression of horror, despair, and indignation.

1. What tone does the main character set for the passage?

A. cool calmness mixed with self-deprecation
B. hypocrisy mixed with resignation
C. optimism mixed with naivety
D. despair mixed with self-absorption

2. The dialogue in lines 45-56 is in reference to

A. a dream.
B. a past memory.
C. an explanation.
D. a description of past events.

3. Which choice best provides evidence for the answer to the previous question?

A. Lines 45-46 ("Yes … reverie.")
B. Lines 55-56 ("and … remembered.")
C. Lines 74-78 ("And … brows.")
D. Lines 79-80 ("Ah … happened.")

4. As used in line 27, "situation" most nearly means

A. environment.
B. setting.
C. post.
D. condition.

5. What do lines 67-74 indicate about Stepan's character?

A. He's a creature of habit.
B. He's forgetful.
C. He's self-indulged.
D. He's excessively spoiled.

6. Which of the following best describes the organization of the passage?

A. generalizations followed by specific instances
B. specific instances followed by contradicting facts
C. premise followed by supporting details
D. hypothesis followed by a refutation

7. On the basis of the passage, which of the following statements about Stepan can most reasonably be made?

A. His regret is superficial.
B. His love for his wife outweighs her love for him.
C. He is unbothered by his deceitful acts.
D. He is aware of the chaos within the household.

8. Which choice best provides evidence for the answer to the previous question?

A. Lines 20-22 ("The … days.")
B. Lines 63-69 ("And … morocco.")
C. Lines 85-88 ("Yes … blame.")
D. Lines 90-93 ("Oh … quarrel.")

9. As used in line 30, “warning” most nearly means

A. reprimand.
B. premonition.
C. information.
D. notice for resignation.

10. The author uses the term “unlucky” in line 101 to

A. emphasize the lack of luck the letter has.
B. identify the letter as a bad omen.
C. highlight the trigger of the problem at hand.
D. shift blame from Stepan to the letter.

The first edited passage is from The English Constitution *by William Blackstone discussing the cabinet government. Passage 2, taken from* Commentaries on the Laws of English *by Walter Bagehot, discusses the rights of Parliament.*

Passage 1

Cabinet government is rare because its prerequisites are many. It requires the co-existence of several national characteristics which are not often found together in the world, and which should be perceived more distinctly than they often are. It is fancied that the possession of a certain intelligence, and a few simple virtues, are the sole requisites. The mental and moral qualities are necessary, but much else is necessary also. A Cabinet government is the government of a committee selected by the legislature, and there are therefore a double set of conditions to it: first, those which are essential to all elective governments as such; and second, those which are requisite to this particular elective government. There are prerequisites for the genus, and additional ones for the species.

The first prerequisite of elective government is the *mutual confidence* of the electors. We are so accustomed to submit to be ruled by elected Ministers, that we are apt to fancy all mankind would readily be so too. Knowledge and civilisation have at least made this progress, that we instinctively, without argument, almost without consciousness, allow a certain number of specified persons to choose our rulers for us. It seems to us the simplest thing in the world. But it is one of the gravest things.

The peculiar marks of semi-barbarous people are diffused distrust and indiscriminate suspicion. People, in all but the most favoured times and places, are rooted to the places where they were born, think the thoughts of those places, can endure no other thoughts. The next parish even is suspected. Its inhabitants have different usages, almost imperceptibly different, but yet different; they speak a varying accent; they use a few peculiar words; tradition says that their faith is dubious. And if the next parish is a little suspected, the next county is much more suspected. Here is a definite beginning of new maxims, new thoughts, new ways: the immemorial boundary mark begins in feeling a strange world. And if the next county is dubious, a remote county is untrustworthy. "Vagrants come from thence," men know, and they know nothing else. The inhabitants of the north speak a dialect different from the dialect of the south: they have other laws, another aristocracy, another life. In ages when distant territories are blanks in the mind, when neighbourhood is a sentiment, when locality is a passion, concerted co-operation between remote regions is impossible even on trivial matters. Neither would rely enough upon the good faith, good sense, and good judgment of the other. Neither could enough calculate on the other.

Passage 2

We are next to treat of the rights and duties of persons, as they are members of society, and stand in various relations to each other. These relations are either public or private: and we will first consider those that are public.

The most universal public relation, by which men are connected together, is that of government; namely, as governors and governed, or, in other words, as magistrates and people. Of magistrates also some are *supreme*, in whom the sovereign power of the state resides; others are *subordinate*, deriving all their authority from the supreme magistrate, accountable to him for their conduct, and acting in an inferior secondary sphere.

In all tyrannical governments the supreme magistracy, or the right both of *making* and of *enforcing* the laws, is vested in one and the same man, or one and the same body of men; and wherever these two powers are united together, there can be no public liberty. The magistrate may enact tyrannical laws, and execute them in a tyrannical manner, since he is possessed, in quality of dispenser of justice, with all the power which he as legislator thinks proper to give himself. But, where the legislative and executive authority are in distinct hands, the former will take care not to entrust the latter with so large a power, as may tend to the subversion of its own independence, and therewith of the liberty of the subject. With us therefore in England this supreme power is divided into two branches; the one legislative, to wit, the parliament, consisting of king, lords, and commons; the other executive, consisting of the king alone.

11. In Passage 1, lines 37-41 indicate which of the following?

- **A.** People are bound to the culture and thoughts of their environment.
- **B.** People have the opportunity to break away from their society and re-build themselves.
- **C.** Some people tend to remain ignorant of other ideas and values.
- **D.** No one is able to endure the thoughts of their environment.

12. Which of the following best summarizes Passage 2?

- **A.** Supreme magistrates hold the sovereign power of the states.
- **B.** A magistrate has limited power in government.
- **C.** Parliament is divided into two sectors to avoid unbalanced power.
- **D.** Among members of society, there exists both public and private affairs.

13. The author in Passage 1 most likely uses quotations in line 55 to

- **A.** demonstrate the ignorance of the men of the community.
- **B.** emphasize the mindset of the members of the community.
- **C.** offer an excuse for the lack of trust in the community.
- **D.** excuse the ignorance among the men in the community.

14. As used in line 25, "submit" most nearly means

- **A.** decide.
- **B.** offer.
- **C.** assert.
- **D.** give in.

15. In Passage 1, the concept of mutual confidence of the electors towards the elective government is viewed as

- **A.** inevitable.
- **B.** necessary.
- **C.** detrimental.
- **D.** fundamental.

16. Which choice best provides evidence for the answer to the previous question?

- **A.** Line 34 ("But … things.")
- **B.** Lines 35-37 ("The … suspicion.")
- **C.** Lines 49-54 ("Here … untrustworthy.")
- **D.** Lines 68-69 ("Neither … other.")

17. The writing style in Passage 1 differs from Passage 2. Passage 1 is

- **A.** anecdotal, whereas Passage 2 is experimental.
- **B.** narrated, whereas Passage 2 is a critique.
- **C.** critical, whereas Passage 2 is systematically informative.
- **D.** analytical, whereas Passage 2 is complementary to a primary source.

18. As used in line 96, "possessed" most nearly means

A. in control.
B. preoccupied.
C. owned.
D. enchanted.

19. In Passage 2, the author would agree with which of the following statements?

A. Politics is the bond between the people and its government at the level of the state.
B. Tyranny is a pre-disposition found in all magistrates.
C. England's power is through the authority of the king.
D. People are subordinate to the higher authority.

20. Which choice best provides evidence for the answer to the previous question?

A. Lines 76-80 ("The … people.")
B. Lines 80-86 ("Of … sphere.")
C. Lines 93-98 ("The … himself.")
D. Lines 105-110 ("With … alone.")

21. Which point from Passage 2 would the author of Passage 1 disagree with?

A. Government is a public relation, part of the people and for the people.
B. There is an unwillingness to entrust large power to the executive authority for the possibility of the subjects' oppression.
C. Two powers, making and enforcing laws, in the hands of the same person limits public liberty.
D. Subordinate magistrates are accountable for their actions and decisions made.

The following edited passage is taken from A Textbook of Assaying: For the Use of Those Connected with Mines *by Cornelius Beringer and John Jacob Beringer on wet gravimetric methods.*

Zinc occurs in nature most commonly as sulphide (blende); it also occurs as carbonate (calamine) and silicate (smithsonite). Each of these is sufficiently abundant to be a source of the metal. The metal is known in commerce as "spelter" when in ingots, and as sheet zinc when rolled. It is chiefly used in the form of alloys with copper, which are known as brasses. It is also used in the form of a thin film, to protect iron goods from rusting—galvanised iron.

Ores of zinc, more especially blende, are met with in most lead, copper, gold, and silver mines, in larger or small quantities scattered through the lodes. Those ores which generally come under the notice of the assayer are fairly rich in zinc; but alloys and metallurgical products contain it in very varying proportions. Zinc itself is readily soluble in dilute acids; any residue which is left after boiling with dilute hydrochloric or sulphuric acid consists simply of the impurities of the metal; this is generally lead.

All zinc compounds are either soluble in, or are decomposed by, boiling with acids, the zinc going into solution. Zinc forms only one series of salts, and these are colourless. Their chief characteristic is solubility in an alkaline solution, from which sulphuretted hydrogen produces a white precipitate of zinc sulphide. Zinc is detected by dissolving the substance in hydrochloric or nitric acid, boiling, and adding sodic hydrate in excess, filtering, and adding ammonic sulphide to the filtrate. The precipitate contains the zinc, which can be dissolved out by boiling with dilute sulphuric acid, and detected by the formation of a white precipitate on the addition of potassic ferrocyanide.

The dry assay of zinc can only be made indirectly, and is unsatisfactory. Zinc is volatile, and at the temperature of its reduction is a gas. It is impracticable to condense the vapour so as to weigh the metal, consequently its amount is determined by loss. The following method gives approximate results: Take 10 grams of the dried and powdered ore and roast, first at a low temperature and afterwards at a higher one, with the help of carbonate of ammonia to decompose the sulphates formed; cool and weigh. The metals will be present as oxides. Mix with 2 grams of powdered charcoal and charge into a black-lead crucible heated to whiteness, cover loosely, and leave in the furnace for about a quarter of an hour. Uncover and calcine the residue, cool and weigh. The loss in weight multiplied by 8.03 gives the percentage of zinc in the ore.

Volumetric determination is based on the facts that zinc salts in an acid solution decompose potassium ferrocyanide, forming a white insoluble zinc compound; and that an excess of the ferrocyanide can be detected by the brown coloration it strikes with uranium acetate. The method resembles in its working the bichromate iron assay. The standard solution of potassium ferrocyanide is run into a hot hydrochloric acid solution of the zinc until a drop of the latter brought in contact with a drop of the indicator (uranium acetate) on a white plate strikes a brown colour. The quantity of zinc in the solution must be approximately known; run in a little less of the ferrocyanide than is expected will be necessary; test a drop or two of the assay, and then run in, one or two c.c. at a time, until the brown colour is obtained. Add 5 c.c. of a standard zinc solution, equivalent in strength to the standard "ferrocyanide," re-titrate, and finish off cautiously. Of course 5 c.c. must be deducted from the reading on the burette. The precipitate of zinc ferrocyanide formed in the assay

solution is white; but if traces of iron are present, it becomes bluish. If the quantity of ferrocyanide required is known within a few c.c., the finishing point is exactly determined in the first titration without any addition of the standard zinc solution. Unfortunately this titration serves simply to replace the gravimetric determination, and does not, as many volumetric processes do, lessen the necessity for a complete separation of any other metals which are present. Most metals give precipitates with ferrocyanide of potassium in acid solutions. If the conditions are held to, the titration is a fairly good one, and differences in the results of an assay will be due to error in the separation. Ferric hydrate precipitated in a fairly strong solution of zinc will carry with it perceptible quantities of that metal. Similarly, large quantities of copper precipitated as sulphide by means of sulphuretted hydrogen will carry zinc with it, except under certain nicely drawn conditions. When much copper is present it is best separated in a nitric acid solution by electrolysis.

22. The purpose of the first paragraph is to

- **A.** outline main ideas.
- **B.** present a hypothesis.
- **C.** provide a definition.
- **D.** introduce a critique.

23. As used in line 1, "occurs" most nearly means

- **A.** takes place.
- **B.** exists.
- **C.** comes to mind.
- **D.** suggests itself.

24. The author guides the reader through the workings of assaying zinc by

- **A.** defining the origin of zinc.
- **B.** providing information, whether necessary or unnecessary.
- **C.** giving a basic overview.
- **D.** providing an experimental example.

25. Which choice best provides evidence for the answer to the previous question?

- **A.** Lines 1-4 ("Zinc … (smithsonite).")
- **B.** Lines 13-16 ("Ores … lodes.")
- **C.** Lines 30-33 ("Their … sulphide.")
- **D.** Lines 49-50 ("The … results:")

26. The author mentions all of the following EXCEPT:

- **A.** Zinc forms a colourless series of salts.
- **B.** Zinc is unpredictable.
- **C.** The precipitate of zinc ferrocyanide can either be white or blue depending on the presence of iron.
- **D.** The titration of zinc is more trustworthy than the gravimetric method.

27. As used in line 46, "reduction" most nearly means

- **A.** diminution.
- **B.** expansion.
- **C.** demotion.
- **D.** discount.

28. The transition from the first half of the passage to the second half starting at line 65 can best be described as

- **A.** generalization to supporting details.
- **B.** exposition to a specific method.
- **C.** argumentative to rhetorical.
- **D.** evidence-based to persuasive.

29. Which of the following must be true for volumetric determination of zinc to take place?

- **A.** The amount of zinc used should be unascertained.
- **B.** An indicator must be present that turns brown when there is an excess of zinc.
- **C.** If excess iron is detected, the solution turns blue.
- **D.** Zinc salts do not decompose during titration.

30. Which choice best provides evidence for the answer to the previous question?

A. Lines 65-69 (“Volumetric … compound;”)
B. Lines 73-80 (“The … colour.”)
C. Lines 80-82 (“The … known;”)
D. Lines 93-94 (“but … bluish.”)

31. Which of the following most resembles the relationship between “the precipitate of zinc ferrocyanide” and “iron” (lines 91-94) as described in the passage?

A. A car filled with unfiltered water results in a radiator blocked with limestone.
B. Excessive rain in the desert results in flooding.
C. A rock thrown in a lake results in ripples.
D. Adding lemon to a main dish results in a sour tang.

The following edited passage is taken from Manual Of Egyptian Archaeology And Guide To The Study Of Antiquities In Egypt *by Gaston Maspero on early private dwellings.*

The lower classes lived in mere huts which, though built of bricks, were no better than those of the present fellahin. At Karnak, in the Pharaonic town; at Kom Ombo, in the Roman town; and at Medinet Habû, in the Coptic town, the houses in the poorer quarters have seldom more than twelve or sixteen feet of frontage. They consist of a ground floor, with sometimes one or two living-rooms above. The middle-class folk, as shopkeepers, sub-officials, and foremen, were better housed. Their houses were brick-built and rather small, yet contained some half-dozen rooms communicating by means of doorways, which were usually arched over, and having vaulted roofs in some cases, and in others flat ones.

Some few of the houses were two or three storeys high, and many were separated from the street by a narrow court, beyond which the rooms were ranged on either side of a long passage; and yet oftener the house fronted close upon the street. In the latter case the façade consisted of a high wall, whitewashed or painted, and surmounted by a cornice.

Even in better houses the only ornamentation of their outer walls consisted in angular grooving, the grooves being surmounted by representations of two lotus flowers, each pair with the upper parts of the stalks in contact. The door was the only opening, save perhaps a few small windows pierced at irregular intervals. Even in unpretentious houses, the door was often made of stone. The doorposts projected slightly beyond the surface of the wall, and the lintel supported a painted or sculptured cornice. Having crossed the threshold, one passed successively through two dimly-lighted entrance chambers, the second of which opened into the central court. The best rooms in the houses of wealthier citizens were sometimes lighted through a square opening in the centre of a ceiling supported on wooden columns.

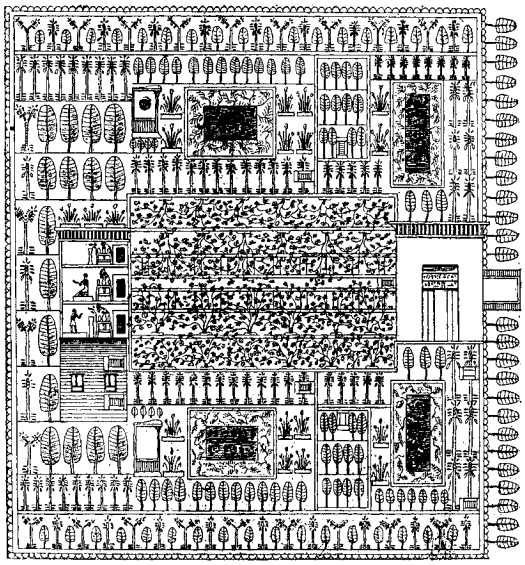
Notwithstanding the prevalence of enteric disease and ophthalmia, the family crowded together into one or two rooms during the winter, and slept out on the roof under the shelter of mosquito nets in summer. On the roof also the women gossiped and cooked. The ground floor included both store-rooms, barns, and stables. Private granaries were generally in pairs, brick-built in the same long conical shape as the state granaries, and carefully plastered with mud inside and out. Neither did the people of a house forget to find or to make hiding places in the walls or floors of their home, where they could secrete their household treasures--such as nuggets of gold and silver, precious stones, and jewellery for men and women--from thieves and tax-collectors alike. Wherever the upper floors still remain standing, they reproduce the ground-floor plan with scarcely any differences.

The rooms were not left undecorated; the mud-plaster of the walls, generally in its native grey, although whitewashed in some cases, was painted with red or yellow, and ornamented with drawings of interior and exterior views of a house, and of household vessels and eatables.

The roof was flat, and made probably, as at the present day, of closely laid rows of palm-branches covered with a coating of mud thick enough to withstand the effects of rain. Sometimes it was surmounted by only one or two of the usual Egyptian ventilators; but generally there was a small washhouse on the roof, and a little chamber for the slaves or guards to sleep in.

The mansions of the rich and great covered a large space of ground. They most frequently stood in the midst of a garden, or of an enclosed court planted with trees; and, like the commoner houses, they turned a blank front to the street, consisting of bare walls, battlemented like those of a fortress. Thus, home-life was strictly secluded, and the pleasure of seeing was sacrificed for the advantages of not being seen. The door was approached by a flight of two or three steps, or by a porch supported on columns and adorned with statues, which gave it a monumental appearance, and indicated the social importance of the family.

If I would convey some idea of the residence of an Egyptian noble,--a residence half palace, half villa,--I cannot do better than reproduce two out of the many pictorial plans. The first represent a Theban house. The enclosure is square, and surrounded by an embattled wall. The main gate opens upon a road bordered with trees, which runs beside a canal, or perhaps an arm of the Nile. Low stone walls divide the garden into symmetrical compartments, like those which are seen to this day in the great gardens of Ekhmîm or Girgeh. In the centre is a large trellis supported on four rows of slender pillars. Four small ponds, two to the right and two to the left, are stocked with ducks and geese. Two nurseries, two summer-houses, and various avenues of sycamores, date-palms, and dôm-palms fill up the intermediate space; while at the end, facing the entrance, stands a small three-storied house surmounted by a painted cornice.



Plan of a house from Eighteenth Dynasty tomb-painting.
Source: Gaston Maspero

32. The passage is most likely written for

- **A.** first year anthropology university students.
- **B.** graduate architecture students.
- **C.** experienced historians.
- **D.** a middle school history class.

33. According to the passage, who of the following would most likely live in a small yet better housing?

- **A.** a farmer
- **B.** a slave
- **C.** a governor
- **D.** a lower representative

34. Which of the following was mentioned in the passage regarding the second floor?

- **A.** The second floor is always the roof.
- **B.** The second floor may collapse with bad weather.
- **C.** The second floor is a replica of the first.
- **D.** The second floor doesn't exist.

35. Which choice best provides evidence for the answer to the previous question?

A. Lines 20-24 ("Some … passage;")
B. Lines 42-46 ("Having … court.")
C. Lines 56-57 ("On … cooked.")
D. Lines 70-73 ("Wherever … differences.")

36. As used in line 15, "communicating" most nearly means

A. separating.
B. transmitting.
C. contacting.
D. connecting.

37. Which of the following best describes the structure of the passage?

A. Organized, beginning from the home of the lowest class to the highest class.
B. Organized, beginning with the homes of the lowest class to the upper-lower class.
C. Disorganized, jumping from the homes of one class to the next unsystematically.
D. Disorganized, beginning with the societal classes to different types of homes.

38. Which of the following can be inferred about the Egyptian nobles based on their homes?

A. They rarely experience conflict.
B. They are isolated.
C. They lack stability in their position.
D. They are disliked by the lower class.

39. Which choice best provides evidence for the answer to the previous question?

A. Lines 85-90 ("Sometimes … in.")
B. Lines 91-92 ("The … ground.")
C. Lines 95-98 ("and … fortress.")
D. Lines 99-101 ("Thus … seen.")

40. Which of the following best describes the meaning of lines (63-70) "Neither … alike."?

A. The people failed to make places in their home to hide their treasures.
B. The people would make the effort to create secret rooms or hiding places for their valuables.
C. Thieves and tax collectors were aware of the placement of the valuables in the home.
D. People would forget to find or make hiding places in the walls or floors of their homes.

41. As used in line 116, "runs" most nearly means

A. dashes.
B. competes.
C. extends.
D. manages.

42. The pictograph supports which of the following paragraphs in the passage?

A. Paragraph 2
B. Paragraph 4
C. Paragraph 6
D. Paragraph 7

The following edited passage is taken from On Laboratory Arts *by Richard Threlfall on the creation of a focus tube.*

Although the glass-blowing involved in the making of a so-called focus tube is rather more difficult than in the case just described, there is no reason why such a difficulty should not be overcome; I will therefore explain how a focus tube may be made.

A bulb about 3 inches in diameter is blown from a bit of tube of a little more than 1 inch diameter. Unless the walls of the tube are about one-eighth of an inch in thickness, this will involve a preliminary thickening up of the glass. This is not difficult if care be taken to avoid making the glass too hot. The larger gas jet described in connection with the soda-glass-blowing table must be employed. In blowing a bulb of this size it must not be forgotten that draughts exercise a very injurious influence by causing the glass to cool unequally; this leads to bulbs of irregular shape.

In the method of construction, the anode is put in first. This anode simply consists of a square bit of platinum or platinum-iridium foil, measuring about 0.75 inch by 1 inch, and riveted on to a bent aluminium wire stem.

As soon as the anode is fused in, and while the glass is still hot, the side tube is put on. The whole of the anode end is then carefully annealed. When the annealing is finished the side tube is bent to serve as a handle when the time comes to mount the cathode. Before placing the cathode in position, and while the main tube is still wide open, the anode is adjusted by means of a tool thrust in through this open end. This is necessary in view of the fact that the platinum foil is occasionally bent during the operation of forcing the anode into the bulb.

The cathode is a portion of a spherical surface of polished aluminium, a mode of preparing which will be given directly. The cathode having been placed inside the bulb, the wide glass tube is carefully drawn down and cut off at such a point that when the cathode is in position its centre of curvature will lie slightly in front of the anode plate. For instance, if the radius of curvature of the cathode be 1.5 inches, the centre of curvature may lie something like an eighth of an inch or less in front of the anode.

The cathode is rather smaller than is advantageous. To make it much larger, however, the opening into the bulb would require to be considerably widened, and though this is not really a difficult operation, still it requires more practice than my readers are likely to have had. The difficulty is not so much in widening out the entry as in closing it down again neatly.

Now as to making the anode. A disc of aluminium is cut from a sheet which must not be too thick — one twenty-fifth of an inch is quite thick enough. This disc is bored at the centre to allow of the stem being riveted in position. The disc is then annealed in the Bunsen flame and the stem riveted on.

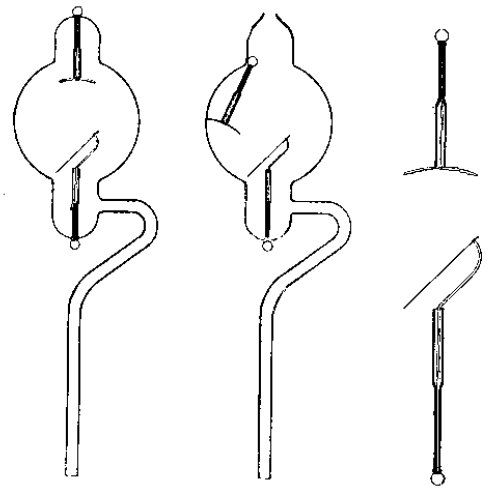
The curvature is best got by striking between steel dies. Two bits of tool steel are softened and turned on the lathe, one convex and the other concave. The concave die has a small hole drilled up the centre to admit the stem. The desired radius of curvature is easily attained by cutting out templates from sheet zinc and using them to gauge the turning. The two dies are slightly ground together on the lathe with emery and oil and are then polished, or rather the

convex die is polished — the other one does not matter. The polishing is most easily done by using graded emery and oil and polishing with a rag.

The aluminium disc is now struck between the dies by means of a hammer. If the radius of curvature is anything more than one inch and the disc not more than one inch in diameter the cathode can be struck at once from the flat as described. For very deep curves no doubt it will be better to make an intermediate pair of dies and to re-anneal the aluminium after the first striking.

When the tube is successfully prepared so far as the glassblowing goes it may be rinsed with strong pure alcohol both inside and out, and dried. The straight part of the side tube is then constricted ready for fusing off and the whole affair is placed on the vacuum pump.

In spite of the great improvements made during recent years in the construction of so-called Geissler vacuum pumps — i.e. pumps in which a Torricellian vacuum is continually reproduced — I am of opinion that Sprengel pumps are, on the whole, more convenient for exhausting Crooke's tubes. A full discussion of the subject of vacuum pumps will be found in a work by Mr. G. S. Ram (The Incandescent Lamp and its Manufacture), published by the Electrician Publishing Company, and it is not my intention to deal with the matter here; the simplest kind of Sprengel pump will be found quite adequate for our purpose, provided that it is well made.



Method of Construction
Source: Richard Threlfall

43. The primary purpose of the passage is to

A. educate the reader on how to avoid creating faults when making a focus tube.
B. introduce the reader to the different sixes of anodes and cathodes.
C. explain how to use an anode.
D. give examples on how to create a curvature.

44. In lines 10-13 (“Unless … glass.”), the author uses evidence that

A. supports the process of making a focus tube without error.
B. supports the process of creating a bulb with irregular shapes.
C. fails to support the difficult process of creating a bulb.
D. fails to support the difficult process of creating irregular bulb shapes.

45. Which of the following is NOT mentioned in the passage?

- **A.** The anode is placed initially in the bulb.
- **B.** The convex die is more important in creating the curvature.
- **C.** The final step is to submerge the tube in a substance and carefully dry it over heat.
- **D.** Expertise is needed to widen the opening of the bulb.

46. Which choice best provides evidence for the answer to the previous question?

- **A.** Lines 24-25 ("In … first.")
- **B.** Lines 60-66 ("To … had.")
- **C.** Lines 86-90 ("The … matter.")
- **D.** Lines 104-107 ("When … dried.")

47. As used in line 77, "got" most nearly means

- **A.** collected.
- **B.** earned.
- **C.** understood.
- **D.** obtained.

48. What is the relationship between the anode and the cathode?

- **A.** The anode doesn't allow a larger cathode into the bulb.
- **B.** Without the anode, the cathode cannot be inserted.
- **C.** The cathode only works when placed in the centre of the anode.
- **D.** If the cathode is rather small, it will benefit the anode.

49. Which choice best provides evidence for the answer to the previous question?

- **A.** Lines 24-25 ("In … first.")
- **B.** Lines 33-36 ("When … cathode.")
- **C.** Lines 48-53 ("The … plate.")
- **D.** Lines 59-60 ("The … advantageous.")

50. As used in line 86, "ground" most nearly means

- **A.** prepared.
- **B.** established.
- **C.** rubbed.
- **D.** constructed.

51. In the last paragraph, the author's use of references to types of vacuum pumps and work by Mr. G. S. Ram

- **A.** weakens his argument for Spengel pumps.
- **B.** reduces value from his argument against the use of Crooke's tube.
- **C.** supports his opinion on Sprengel pumps.
- **D.** contributes to his argument that new contributions have been made in the construction of Geissler vacuum pumps.

52. The graphic supports which of the following steps?

- **A.** A glass tube is blown.
- **B.** An anode is carefully inserted.
- **C.** The curvature is created by two dies.
- **D.** The tube is placed in a vacuum pump.