BASIC WRITING IN ENGLISH
for
SCIENCE & TECHNOLOGY

ANSWERS

M. J. MURPHY Ph. D.

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Ch. 1, Pp. 2–3, Ex. 1:

1. A spanner is a gripping tool which is usually made of steel and which has two parts, a gripping head and a handle.
2. A dam is a structure of concrete or earth built across a river for the purpose of impounding a large volume of water.
3. A bulldozer is a large crawler tractor which is fitted with a large steel blade and which is used for pushing, moving and excavating.
4. The tractor has broken down because of poor maintenance and careless use.
5. The causes of the heavy flooding are blocked sewers and drains and exceptionally heavy rains. / The heavy flooding was caused by blocked sewers and drains and exceptionally heavy rains.
6. The student carefully poured acid into a large flask, put the stopper on it and stored it in a safe place.
7. A solar rice dryer is made of bamboo and plastic, cheap materials which are available to all farmers.
8. Solar energy has three important applications: drying e.g. rice, fish and fruit, heating water and distilling water. / The three important applications of solar energy are: drying e.g. rice, fruit and fish, heating water and distilling water.

P. 4, Ex. 2:

1. That building is a hotel.
2. The experiment was a success.
3. The students were typing their theses.
4. The computer has been programmed.
5. The light has been burning for ten hours.
6. The project was being planned by the committee.
7. Your investigation must be finished by next week.
8. The project might be completed by the end of the year.
9. The plans have been drawn up already.
10. The votes were carefully counted.
11. The building was completed in six months.
12. The new power station will be operating by the end of the year.
13. The heavily-loaded trucks damaged the road surface.
14. Without his safety belt the driver of the car would have been killed.
15. The heavy rains damaged the rice crop.

P. 4, Ex. 3: (Other answers are possible besides those given.)

1. The crops/The trees/The houses etc. were damaged by the storm.
2. The machines/The boxes/The goods etc. have been unloaded from the truck.
3. The cause of the children's illnesses was contaminated drinking water.

4. The object of these investigations is/has been the prevention of accidents.
5. The heat of the sun burns/injures the skin of some people.
6. The top/peak of the mountain rises/stands 10,000 ft above sea-level.
7. A chisel/A plane etc. is a cutting tool.
8. Water buffaloes/Goats are very useful animals in S.E. Asia.
9. The bunch of bananas is/is lying on the table.
10. The crane/The tractor etc. beside that building over there is the property of the Engineering Faculty.
11. The students in the Faculty of Medicine are writing their theses.
12. The question of conserving energy was brought up/was discussed at the meeting yesterday.
13. The problems of water pollution will be discussed/will be brought up at the conference next month.
14. The irrigation project is for the benefit of the farmers.
15. The crops/plants etc. in these two fields have been attacked by a very serious disease.

Pg 5, Ex. 4:

1. Each student typed his thesis himself. / Each student typed her thesis herself.
2. Both men and women students have equal voting rights.
3. All the buildings in that row have faults in their foundations.
4. The socio-economic considerations in this project have been discussed.
5. Each student must put his/her best efforts into every piece of work.
6. Not one person among all these scientists disagrees with this theory.
7. Everyone has passed his/her examination.
8. The results of the engineer's investigation were inconclusive.
9. The pollution caused by the factories was widespread in its effects.
10. The result of the careless storage and disposal of wastes is the breeding of vectors of disease.
11. The widespread flooding of low-lying agricultural areas causes a great loss of crops.
12. The great number of vehicles in modern cities causes serious congestion.
13. These six people constitute a committee.
14. The exhaust of vehicles because of its deadly components is harmful to humans.
15. The construction of the dams has been delayed.

P. 5, Ex. 5:

The process of prestressing concrete, which consists of putting it into a state of compression by tensioning steel wires or bars which pass through it, was conceived at the beginning of the 20th century and undoubtedly represents the most important advance in bridge construction since reinforced concrete came into general use. The economies in material which prestressing has rendered possible led to its rapid development in the period of shortages during and after World War II. The use of precast sections supported on novel systems of cantilevered and suspended centring and thereafter prestressed, has led to a marked increase in the length of simple or continuous spans which are able to be built.

P. 6, Ex. 6:

During recent years the number of cars in most countries has been gradually increasing. In Britain in 1970 there were over 11 million cars for a population of 55 million. There must be a limit to the number of cars that can be allowed and it may be reached before the end of this century.

Cars produce problems for people. One of them is noise; noise from engines and blowing of horns. Noise is measured in decibels and it has been found that too high a level of noise can damage people's hearing and badly affect their nerves.

Another problem is air pollution. Car engines give out exhaust fumes that contain many poisonous chemicals like lead and carbon monoxide gas. In cities the air becomes filled with these chemicals which are breathed in by many people and which can thus affect their health. They can be especially dangerous to children.

P. 6, Ex. 7:

In the primary school children are seeking simple answers to their questions which usually begin with: 'What is it?' First of all, science is not a lot of things it was once thought to be. What is science then? It is a study of the problems that are found wherever children live. More formally stated, it is a study of the natural environment – not merely pieces of chemistry, physics and biology etc. Its content is connected with those subjects but it is a study of problems that pop into curious children's minds as they live and grow from one day to the next. There are problems such as: 'What makes the wind blow? What's in a cloud? What's a stone made of? What does a bell do when it rings?' Anyone who has ever worked with primary school girls and boys knows that most of them are full of questions like this and like to know the answers to them. Well, finding the answers to such questions – that is science.

Ch. 2, Pp. 7–8, Ex. 1: (Other answers are possible besides those given.)

1. The drinking water used by the village people was badly polluted. / The well water used by the working people was seriously polluted.
2. The red Nissan truck was badly damaged yesterday.
3. That small red flower is extremely poisonous.
4. That large black American car has been carefully maintained.
5. That small cylindrical plastic object is part of a tractor engine.
6. The efficient disposal of industrial wastes is very important.
7. Liquid industrial effluent can cause serious pollution.
8. Small faults may frequently occur in concrete buildings.
9. Slum people desperately require hygienic housing.
10. The unexpected floods last year severely damaged the tobacco crop.

11. The German-made electric motor broke down completely yesterday.
12. The practical biology test this morning was very difficult.
13. That large black Alsatian dog can detect dangerous drugs.
14. The government agricultural project was completed quickly and satisfactorily.
15. The severe tropical storm caused serious agricultural damage.

Pp. 9–10, Ex. 2:

1. He is a hard-working student.
2. How can people in cities breathe the exhaust-polluted air?
3. That square-shaped building is a pump house.
4. The contractor was using a pile-driving machine.
5. A carefully-planned thesis is a pleasure to read.
6. You could see by the insect-eaten leaves how badly the crops were damaged.
7. A tripod is a three-legged stand.
8. In industry clear-headed people are needed to make important decisions.
9. She is a slow-thinking person.
10. Slow-moving traffic should keep to the inside lane.
11. That sharp-pointed tool belongs to the carpenter.
12. To speed up the irrigation works they used a ditch-digging machine.
13. The student's thesis consisted of 100 carefully-typed pages.
14. Water-powered electricity generators are in use in some rural communities.
15. A pentagon is a five-sided figure.
16. The closing of petrol stations on Sundays is an energy-conserving measure.
17. Sugar is a sweet-tasting substance.
18. Every leaf on the plant had on it a brown-coloured stain.
19. All the activities at the Institute should be student-oriented.
20. The company had a sale of fire-damaged goods.

Pp. 10–11, Ex. 4:

1. Parts of certain nerve cells in the body are called dendrites because they have a tree-like pattern.
2. The materials were heated in a flask and the result was a jelly-like substance.
3. This material, although it has a glass-like appearance, is extremely strong.
4. The gorilla and the orangutan belong to the class of man-like animals.
5. Although this material is synthetic, it has a wood-like texture and appearance.
6. This shaft has a piston-like movement.
7. There are particles in the human blood that have a disc-like shape.
8. The student went about his investigation in a workman-like manner.
9. The substance that results from this reaction has a sponge-like feel and appearance.
10. The building was a box-like structure.

11. The little girl had a lady-like manner.
12. At the conclusion of the experiment a glue-like substance remained in the bottom of the flask.
13. The surface of the road had taken on a wave-like appearance.
14. The mechanic had a special spanner that had a vice-like grip.
15. The baboon is a type of monkey with a dog-like facial appearance.
16. The government built many tower-like blocks of flats.
17. The shape of the new submarine was slender and cigar-like.
18. The body of the fish was long and snake-like.
19. Some tropical trees have a paper-like bark that is used to make a type of cloth.
20. The large umbrella-like trees cast a wide area of shade.

Pp. 12–13, Ex. 5:

1. The structure on top of that building is a radio mast.
2. That plant with the red flower by the side of the road is poisonous.
3. The solution to this social problem is obvious to all government agencies.
4. The results of the investigation have been recorded by the engineer in the conclusion of his report.
5. That book with the blue cover on the top shelf is mine.
6. The preparations for the conference were completed by the organizing committee at the beginning of last week.
7. The machine in the garage is ready for instant use.
8. The floods in the southern region at the end of last year caused damage to the irrigations systems.
9. This machine in the government store is useless to poor badly-educated farmers.
10. The drain under the main road is blocked with weeds and rubbish.
11. More than two years ago the Professor of Engineering at the University of Hong Kong wrote a book about the effects of monsoon rain on the stability of steep hillsides.
12. For the past two years the factory close to the village has been causing pollution of agricultural water with toxic chemical effluents.
13. An investigation into the reasons for the failure of the project has been ordered by the Prime Minister.
14. Since the beginning of this century the climate in the northern part of Thailand has undergone noticeable changes because of deforestation and the inefficient use of agricultural land.
15. During the course of the last century in England the design of the steam engine for the purposes of transportation changed rapidly.

P. 14, Ex. 6:

1. Last month the crops in the low-lying districts were ruined by floods.
2. The equipment from Japan for the Engineering Faculty must be unpacked by the workmen with great care.

3. The records of temperature and rainfall in the Central Plains area for the past ten years are kept in the Central Meteorological Office in Bangkok.
4. The structure on your right with the plastic chimney is a solar rice dryer for the farmers of this village.
5. The biogas plants in use in many areas of Asia are very economical for rural communities with low incomes.
6. At this moment a hurricane of exceptional force in the China Sea is approaching Hong Kong from a south easterly direction at the rate of 15 km. per hour.
7. A theory of great importance concerning the position of the earth in relation to the sun and to the other planets was propagated in the 16th century by a Polish astronomer by the name of Copernicus.
8. In this modern age drinking water for urban and rural communities should be uncontaminated by sewage, effluent or other agents from any source whatsoever.
9. The bridge across the river at this point is supported by girders of specially-cast steel from the Krupps factory in Germany.
10. At the present moment, gases from hundreds of thousands of vehicles with inefficient exhaust mechanisms are polluting the atmosphere of cities all over the world.

Pp. 14–15, Ex. 7:

Over the last few years a rice-planting machine of high quality and with a reliable performance has been produced by Mitsubishi of Japan. It was tested by the manufacturers with great thoroughness under varying conditions over a period of one year in different parts of the country. During the next five years of the new development plan the use of this machine should increase with the easier availability of loans from the government to deserving farmers. At present the machine is on sale in this country at a sufficiently reasonable price for the average farmer with a limited income. (Position of last two sentences may be inter-changed.)

P. 15, Ex. 8:

In a child's early years the teaching of science must be based on observation of the varied things in the environment of the child. With the help of the teacher this observation of the environment leads the child to an enrichment of his knowledge of the world around him. Observation on its own, however, is not enough for the enquiring mind of the child even at this early stage in his development. Experiments of a simple nature need to be carried out as a support or otherwise for the child's explanations of natural happenings in his environment. A child, for example, observes in certain seasons the rapid growth of the farmer's crops under the influence of sun and rain. The teacher then may lead the child towards simple experiments about the importance of warmth and moisture for the growth of plants.

Pp. 15–17, Ex. 9:

1. The farmers used a small, inexpensive, petrol-driven pump for pumping water for their ricefields from the nearby river.
2. The fully-equipped geological laboratory is frequently used by students from the Highway Engineering Division.
3. This type of four-wheeled, rubber-tyred tractor is widely used by small farmers in this area.
4. It is difficult to erect many-storeyed (or multi-storeyed) buildings on sites close to the river because of the amount of water in the ground.
5. The hard-working farmers in this mountainous area are being helped by the government with generous long-term loans for seed and fertilizer.
6. The newly-developed material was thoroughly tested in the government laboratory for tensile strength.
7. The compressed mixture of petrol vapour and air in the combustion chamber is ignited by means of a spark from the sparking plug.
8. This heavy, powerful tractor with caterpillar tracks and with a large steel blade on the front is known as a bulldozer.
9. Accidents of all kinds in factories and on worksites are the cause of serious injuries to workmen and also of financial loss to the workmen's employers.
10. This small, two-wheeled, petrol-driven tractor is designed for use by vegetable farmers with a small area of land under cultivation.

Pp. 17–18, Ex. 10: (Other variations are possible besides those given.)

Cars produce many problems for people in heavily-populated cities. One problem is the high level of noise from the blowing of horns and from engines, especially those of heavy commercial vehicles. Such a level of noise can, without their knowledge, badly affect people's hearing and nerves. Another problem is the poison-laden atmosphere full of chemicals and harmful gases from the exhausts of vehicles. A third problem, especially in rush hours, is the serious congestion in city streets caused by the excessive number of vehicles of all sorts. This congestion causes more noise and also more damage to nerves because of the frustration and anger of drivers behind the steering wheels of slow-moving or stationary vehicles. A fourth problem is the increasing number of deaths of people of all ages and from all walks of life in terrible and often senseless accidents.

Ch. 3, P. 19, Ex. 1: (Some suggested sentences. Others are possible.)

Between the years 1900 and 1970 the consumption of all tobacco rose from 7.5 lb per person to 10.5 lb per person per year.
In 70 years from 1900 to 1970 the consumption of cigarettes showed a remarkable increase from 50 per head per year to 4,000 per head per year.
During these years the consumption of cigars fell by about half from 110 per person per year to 59 per person per year.

During these years the consumption of cigarettes increased by 80 times.
The consumption of snuff remained relatively stable. The consumption of chewing tobacco decreased considerably.
etc. etc.

P. 20, Ex. 2: (Some suggested sentences. Others are possible.)

Mercury is the only metal with a melting point below 0°C.
Of all the metals in the graph, tungsten has the highest melting point.
The melting point of tungsten is almost twice that of iron.
The metal with the lowest melting point above 0°C is potassium.
There is not a great difference between the melting points of silver and of gold.
The melting points of the metals in the graph vary from −100°C to 3,500°C.
etc. etc.

P. 21, Ex. 3: (Some suggested sentences. Others are possible.)

The country with by far the greatest number of telephones in 1976 was the United States.
The number of telephones in the United States in 1976 was almost 3½ times the number of telephones in Japan.
The difference between the country with the smallest number of telephones, Australia, and the country with the greatest number, the United States, is 143.5 million.
In 1976 the Soviet Union was the country with the fourth largest number of telephones.
The country with the third greatest number of telephones after the United States and Japan is the United Kingdom with 21.2 million.
etc. etc.

P. 22, Ex. 4: (Some suggested sentences. Others are possible.)

There is a great variation in the lifespans of animals.
One of the shortest lifespans is that of the mayfly. This lasts for only one day.
The animal with by far the greatest lifespan of about 100 years is the tortoise.
The difference between the longest and the shortest lifespan is over 100 years.
The lifespan of man comes between that of the elephant and the tortoise.
Man is one of the longest living of animals.
Small domestic animals like the cat and the dog have relatively short lifespans of about 12 to 18 years.

Suggested paragraph:

The lifespans of animals vary greatly. The variation from the shortest to the longest span is about 100 years. Of all the animals the tortoise is the longest living with a lifespan of about 100 years. The animal with the shortest lifespan of about one day is

the mayfly. After the tortoise, man is the next longest living animal. He enjoys a lifespan of about 70 or more years. Small domestic animals like cats and dogs have a relatively short lifespan of between 10 to 20 years. Wild animals, however, like the pelican, the dolphin and the elephant enjoy much longer lifespans from about 45 to nearly 70 years.

P. 23, Ex. 5:

The diagram illustrates the principle of a sand filter for muddy water.
It consists of a large glass container on a stand.
In the bottom of this container there is a hole with a glass tube in it.
This allows the filtered water to flow out of the container.
This filtered water is caught in a small glass container.
The filter itself consists of four layers of different materials.
These four layers in order from top to bottom are: fine silver sand, ordinary sand, gravel, stones.
The materials in these layers vary in coarseness from fine sand to quite large stones.
The muddy water is poured into the top of the glass container.
It filters slowly down through the different layers of materials from the finest to the coarsest.
In this way the particles of dirt and other impurities in the water are caught in the various layers.
As a result the water from the outlet tube is quite clean.

Suggested paragraphs:

This diagram illustrates the principle of a sand filter for muddy water. The filter consists of a large glass container on a stand. In the bottom of this glass container there is a hole with a glass outlet tube in it. The filtered water flows through this tube into the small glass container underneath. The filter itself consists of four layers of different materials. These four layers in order from top to bottom are: fine silver sand, ordinary sand, gravel, stones. The materials in these layers vary in coarseness from fine sand to quite large stones.

The muddy water is poured into the top of the large container. It filters slowly down through the different layers of materials from the finest to the coarsest. In this way the particles of dirt, gravel and other solid impurities in the water are caught in the various layers. As a result, the water from the outlet tube is quite clean.

Pp. 24–25, Ex. 6:

Suggested paragraph:

A long glass funnel and a short right-angled bend are fitted into a rubber stopper. The glass funnel is much longer than the right-angled bend. Next, a length of rubber tube is fitted to the right-angled bend. Now some pieces of zinc are placed in a glass flask. The rubber stopper with the glass funnel, the right-angled bend and the rubber

tubing is now fitted tightly into the top of the glass flask. The lower end of the funnel should reach to almost the bottom of the flask. A glass trough is now half filled with water from the tap. Then a large glass bottle full of water is stood upside-down in the trough of water. The flask is now arranged beside the trough with the other end of the rubber tubing under the mouth of the inverted bottle. Some hydrochloric acid is now poured into the flask through the glass funnel. The acid reacts with the zinc in the flask. Hydrogen gas is given off. The gas flows out through the right-angled bend and the rubber tubing into the bottle. It is collected in the bottle.

Ch. 4, Pp. 27–28, Ex. 1:

1. As a result of studying too hard, the student made his illness much worse.
2. Correct (constructing – contractor)
3. Correct (meeting – the river)
4. After considering your application, the committee has not given you the position.
5. Before sitting the examination, the student was extremely nervous.
6. Correct (being heated – the metal)
7. On arriving at the Institute, the student must register.
8. By working very hard, the farmers finished the project on time.
9. Correct (starting – you)
10. After finishing the experiment, the scientist wrote up the results.
11. Correct (being sterilized – food)
12. Correct (being constructed – the building)
13. As a result of being carelessly constructed, the building developed quite serious structural faults.
14. Correct (completing – the student)
15. Correct (using – the villagers)

P. 28, Ex. 2: (Suggested answers. Many others are possible.)

1. Before starting the car, look out for other traffic.
2. On completing your report, check it carefully for mistakes.
3. Before making a decision, have a good night's sleep.
4. When writing a report, express yourself clearly and simply.
5. When handling explosive materials, exercise the greatest care.
6. After using any piece of equipment in the laboratory, make sure it is not left lying about.
7. Before signing any agreement or contract, always read it very carefully.
8. While attending any meeting, always pay attention to the speakers.
9. Avoid serious injury to your body by wearing protective clothing.
10. By using Tiger brand petrol, give your car a longer life.

P. 29, Ex. 3: (Suggested answers. Many others are possible.)

1. Ensure your children's health by giving them a well balanced diet.
2. Take great care when crossing a busy intersection.
3. Always turn off the electricity when going to bed at night.
4. Think very carefully before making decisions.
5. Make sure the petrol tank is full when setting out on long journeys.
6. Drink only boiled water when travelling in a strange country.
7. Before commencing an experiment, make sure your equipment is in good order.
8. Avoid road accidents by driving more carefully.
9. Do away with inefficiency and waste by electing the Democratic Party candidate.
10. When buying any sort of pumping equipment, consult the world's leading manufacturer.

P. 30, Ex. 4:

1. Before committing themselves to any particular make, the university authorities obtained information from all the main manufacturers of computers.
2. After gaining his Master of Engineering at the Institute of Technology, he went to Australia to study for his Ph.D.
3. Before beginning any project, those involved must be familiar with the aims of the project.
4. As a result of drinking polluted river water, the villagers had contracted many serious intestinal diseases.
5. On completing his investigation into the cause of the accident, the investigator wrote a lengthy report.
6. By employing extra workmen, the contractor managed to complete the building within the required time.
7. As a result of seriously overloading his vehicle, the driver overturned his truck on a sharp bend.
8. When carrying out an experiment, first of all assemble the apparatus.
9. When writing a report, make sure each paragraph follows the other in a logical sequence.
10. Exercise extreme care while using any sort of electrical equipment.
11. On reading the conditions very carefully, the company decided not to tender for the contract.
12. Before giving a permit to the company to build a chemical factory close to the river, the City Council studied their plans for effluent treatment very carefully.
13. The health inspector went to inspect the slum area after hearing reports of an outbreak of cholera.
14. On leaving the university at the end of the conference, the distinguished guest thanked the university authorities.
15. The government aimed to help the poor farmers by making it easier for them to obtain loans.

P. 31, Ex. 5:

By wearing sensible clothing suitable for the job an industrial worker can avoid many accidents and injuries. For example, when working near fast-moving machinery, it is advisable not to wear loose ties, scarves and long sleeves. Hair can also be a danger. By allowing his hair to hang loose and free a worker is increasing the danger of its being caught in moving machinery. A worker is also liable to injure his feet severely especially when shifting or moving heavy objects. He can lessen this danger considerably by wearing boots with reinforced toes. The rule is: Avoid injury by making sure your body is well protected.

P. 31, Ex. 6:

When lifting heavy objects the body can sustain injury. Most of this injury is to the back and the muscles. However, by following six simple rules, much of this sort of injury can be avoided.

Rule i Take a strong grip by gripping with the full palm of the hand. A grip with the fingers only can injure the weak arm muscles.

Rule ii Also avoid straining the weak arm muscles by keeping the arms close to the body.

Rule iii Keep the head and body in proper line by slightly elongating the neck and tucking the chin in.

Rule iv Keep an even stress in the vertebral discs and employ the back muscles safely by adopting and maintaining a flat back during effort.

Rule v When performing any action the body needs to be balanced. Therefore, by balancing the body properly with feet apart, the proper effort can be applied to lifting the weight.

Rule vi Overcome the inertia of the object by using the body's weight and its strongest muscles.

Therefore, before lifting any heavy weights in the future, think first of these six simple rules.

Pp. 32–33, Ex. 7:

1. Being new, this machine must be treated carefully.
2. Being a genius at mathematics, the professor did not understand the students' difficulties.
3. Not realizing the difficulties, the student embarked on a very complicated piece of research.
4. Not knowing of the government's decision to discontinue the project, the project head went on with planning for the second phase.
5. Being unable to finish the length of highway on time, the contractor lost a great deal of money.

6. Being a liquid at normal temperatures, mercury does not appear to act like a metal.
7. Being highly inflammable, hydrogen proved unsafe for use in airships.
8. Being itself a large magnet, the earth has north and south magnetic poles like any other magnet.
9. Being a good conductor of electricity, copper is often used in electric wires and cables.
10. Not happening to be present at the time, I did not hear the visiting professor's brilliant lecture on microbiology.
11. Not expecting to encounter any opposition, Edward Jenner spread the good news about his discovery of vaccination.
12. Being situated in a valley, the city is protected from the strong southerly winds.
13. Being constructed mainly from alloys of aluminium, modern aircraft bodies are light but extremely strong.
14. Being affected by moisture, this substance should be kept in a dry place.
15. Being recognised as an authority in his field, the professor is in demand for lectures and conferences.

P. 33, Ex. 8:

Electric motors are ideal for small installations, there being no other power plant which works satisfactorily at less than one horsepower. Being smell-free and very cool-running they are widely used in the home for refrigerators, vacuum cleaners, fans, etc. In factories there can be a great saving in space by running each lathe, drill or other machine off its own electric motor and so doing away with complicated overhead shafting and drive belts. The electric motor is also one of the most efficient sources of power with as much as 95% of its energy input being turned to useful work. Electric motors revolve at high speed thus requiring gearing to bring the revolutions down for the great many uses to which they are put. This increases the power exerted, of course, if the right choice of gears is made. On the other hand, an electric motor can produce great power at low speed – that is when first starting up. They are, therefore, particularly useful when moving heavy loads, such as an electric train, from rest.

Pp. 34–35, Ex. 9:

1. The buildings were constructed of poor materials thus making them susceptible to damage by earthquake.
2. The canal was blocked with rubbish and water weed thereby causing it to flood in the wet season.
3. The student obtained good results from his experiments thus completing his programme of research.
4. The heavy rains made the hillside unstable thus making several buildings unsafe.
5. The electric current activates the magnet thereby attracting the lever.

6. The sun heats the surface of the land during the day thus heating the air above it and causing it to rise.
7. The inlet valve opens, allowing water to enter the chamber.
8. The seed pod of the plant bursts open spreading the seeds over a wide area.
9. The clutch pedal of the car is pushed down thereby preventing the power from the engine from being transmitted to the wheels.
10. A short circuit caused the wires to become overheated thus blowing the fuse.
11. Jenner infected a small boy with cowpox thereby proving that vaccination was a protection against smallpox.
12. Benjamin Franklin flew a kite during a thunderstorm thus proving lightning to be an electrical discharge.
13. A passer-by applied artificial respiration to the drowning victim thus saving the person's life.
14. The traffic lights failed during the city's rush hour thereby causing terrible traffic jams in the main streets.
15. The price of petroleum rose rapidly thus adversely affecting the economy of the industrial nations.

Pp. 35–36, Ex. 10:

1. Correct (having read – the professor)
2. Correct (having been built – the building)
3. Correct (having tested – the scientist)
4. Having submitted his application, he received the reply within a week.
5. Correct (having completed – the farmers)
6. Having programmed the computer correctly, the researcher completed the calculation in a matter of seconds.
7. Correct (having prepared – the contractor)
8. Correct (having been taught – he)
9. Having carried out the experiments carefully, the researcher obtained valid results.
10. Having received the form, the committee is considering your application.

P. 36, Ex. 11:

1. Having finished his investigation, the student prepared a report.
2. After having added the acid to the mixture, the scientist waited for the chemical reaction to take place.
3. Having flooded his field to the required depth, the farmer plants his seedlings.
4. Having completed the large hotel project, the construction company began work on the new city housing project.
5. Having consulted the catalogue, the student then looked for the book on the library shelves.
6. Having heard many complaints about the pollution of the rivers, the Council decided to launch a clean-up campaign.

7. After having finished his experiment, the student carefully put the apparatus away.
8. Having taught at a university for many years, the professor knew all about students and their excuses for not doing assignments.
9. Having heated the metal to white heat, the blacksmith then shapes it on an anvil.
10. After having checked the gauge, the engineer increased the pressure.

Pp. 36–37, Ex. 12:

By borrowing forms of architecture from other nations and by developing what they borrowed, the Romans became the greatest builders of the ancient world. Having borrowed the arch from their neighbours, the Etruscans, they then proceeded to use it extensively. The arch had the advantage over the old Greek post and beam method of building of not requiring large blocks of stone. By extending the use of the arch, the Romans then developed the vault. The vault was widely used when roofing areas of much greater size without the use of columns. After having extended the use of the arch thus far, the Romans then went on to extend it still further and developed the dome. Much larger areas could now be roofed without the use of pillars.

However, it was the development of concrete by the Romans that made the use of these forms far more effective. Before developing this material, a Roman engineer required many skilled technicians and craftsmen to erect a building. Now, however, after having received plans from his headquarters in Rome, he could erect a substantial building by using only a few technicians and a lot of unskilled workmen.

Pp. 37–38, Ex. 13:

1. Having been sick for several weeks, the student recovered in time for the examination.
2. When being stored, grain must be well ventilated.
3. By being economical, the farmer was able to save money for a tractor.
4. As a result of being badly maintained, the tractor broke down.
5. While being constructed, a building must be inspected regularly.
6. Having considered the problems, the engineer accepted the project.
7. After having consulted an expert, the ministry made a decision.
8. By getting a loan from the bank, the farmers were able to build the dam.
9. As a result of clearing the slum area, the council made many people homeless.
10. Having cleared the land, the contractor levelled the site.
11. After having studied the soil samples, the engineers chose the dam site.
12. By taking samples of effluent, the student ascertained the degree of pollution.
13. As a result of breathing polluted air for many years, many people suffer from respiratory complaints.
14. When doing this experiment, the student exercised great care.
15. When driving a slow-moving vehicle, a driver should keep to the left [illegible]