



UNICUS  
OLYMPIADS

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## Sample Paper



**Class 9**

## Unicus Science Olympiad (USO)

Time: 60 minutes

Pattern and Marking Scheme			
Section	Total Questions	Marks per Question	Total Marks
Classic Section	40	1	40
Scholar Section	10	2	20
Grand Total	50		60

## Classic Section (Each Question is 1 Mark)

1. Earthquakes at two places X and Y were measured by a seismograph which recorded the magnitude as 2 and 6. The magnitude of tremors at X and Y can be compared as under:

- a. tremors at Y are two times that at place X
- b. tremors at Y are four times that at place X
- c. tremors at Y are 1000 times that at place X
- d. tremors at Y are 10000 times that at place X

- 
2. Which of the following statements is correct?

- a. Wind current is generated by the flow of wind from the high-pressure area to low-pressure area.
- b. At the poles, the air gets heated up and rises up creating a region of low pressure.
- c. At the equator, the air sinks to the surface creating a high-pressure area
- d. All of the above

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3. Peter mixed a handful of soil with water, stirred it and allowed it to settle. In which of the following sequence will the soil components arrange themselves from top to bottom?

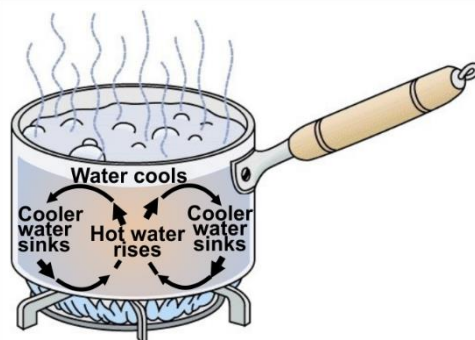
- a. Humus, clay, silt, sand and gravel
- b. Clay, humus, silt, sand and gravel
- c. Humus, silt, sand, clay, gravel
- d. Humus, silt, clay, sand, gravel

- 
4. Spot the similarity between the two animals as shown in the pictures given:



- a. They are good swimmers.
- b. They migrate to warmer regions when winter sets in.
- c. These animals are adapted to live on the trees.
- d. They can see very well in dark.

- 
5. Observe the picture shown below and identify the method of transfer of heat by the circulation of liquid within the saucepan:



- a. Conduction
- c. Convection

- b. Heating
- d. Radiation

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6. Study the table given below and identify X, Y and Z correctly from the given options:

	Parasites	Symbiosis	Insectivorous plants
1.	Cuscuta	Rhizobium	Pitcher plant
2.	X	Y	Z

- a. X – Orchids, Y – Lichens, Z – Sundew
- b. X – Fungi, Y – Algae, Z – China rose
- c. X – Pitcher plant, Y – Mushroom, Z – Cuscuta
- d. X – Lichen, Y – Bacteria, Z – Pitcher plant

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7. Fill in the blank:

Wood charcoal is used in gas masks because it \_\_\_\_\_.

- a. converts gases into harmless substance
- b. adsorbs gases
- c. oxidises poisonous gases
- d. reduces poisonous gases

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8. Which the following statements is/are false?

- 1. A catalyst is highly specific.
- 2. The percentage of yield of products can be influenced by a catalyst.
- 3. All catalysts have a large surface area.
- 4. Chemical composition of a catalyst change during the reaction.

- a. Only 1
- b. Only 2
- c. Both 2 and 4
- d. Both 3 and 4

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9. In the given question, an assertion and a reason are given. Choose the correct option:

**Assertion:** Violet and red light entering from the air, travel the same distances through a glass slab travel for the same time interval.

**Reason:** Velocities of violet and red light travelling through glass slab are same.

- a. Both assertion and reason are true and the reason is the correct explanation of the assertion
  - b. Both assertion and reason are true and the reason is not the correct explanation of the assertion.
  - c. The assertion is true but the reason is false
  - d. Both assertion and reason are false
-

10. In the given question, an assertion and a reason are given. Choose

**Assertion:** In the rainy season, the siren of the train is heard sharply up to a far distance than in summer season.

**Reason:** The density of dry air is more than that of moist air.

- a. Both assertion and reason are true and the reason is the correct explanation of the assertion
  - b. Both assertion and reason are true and the reason is not the correct explanation of the assertion
  - c. The assertion is true but the reason is false.
  - d. The assertion is false but the reason is true.
- 

11. Susan was driving her car when she got caught in a thunderstorm. What do you suggest that she should do to protect herself?

- a. She should get out of the car and take cover under an open shaded area.
  - b. She should run to the nearest tree.
  - c. She should stand near an electric pole.
  - d. She should remain in the car and close the windows and door of the car.
- 

12. Fill in the blanks:

\_\_\_A\_\_\_ industry is an important means of livelihood for many people in our country. But the sorter's job is risky as sometimes they get infected by a bacterium named \_\_\_B\_\_\_, which causes a fatal blood disease called as \_\_\_C\_\_\_.

- a. A - Wool, B - Anthrax, C - Peprine
  - b. A - Wool, B - Bacillus anthracis, C - Anthrax
  - c. A - Silk, B - Bacillus anthracis, C - Anthrax
  - d. A - Silk, B - Anthrax, C - Scabies
- 

13. Consider the following statements and choose the correct option:

**Statement 1:** When pollen grains from the anther of a flower are carried to the stigma of the same flower or other flowers of the same plant, it is called self-pollination

**Statement 2:** When the pollen grains from the anther of a flower of one plant are carried to the stigma of the flower of another plant of the same kind, it is called cross-pollination.

- a. Statement 1 is correct but statement 2 is incorrect
  - b. Statement 1 is incorrect but statement 2 is correct
  - c. Both the statements are correct
  - d. Both the statements are incorrect
- 

14. A metallic element is converted into a compound 'A' after a series of reactions. Compound A turns red litmus to blue. A on reaction with another compound B which turns blue litmus to red gave a compound C which responded to the litmus test like compound B. C on further reaction with A gave a compound D which did not respond to a litmus test. Identify the correct sequence of steps for the formation of A, B, C and D:

- 1.  $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{H}_2\text{O}$
- 2.  $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$
- 3.  $\text{NaHSO}_4 + \text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
- 4.  $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{NaOH}$

- a. 1324
- c. 2413

- b. 2314
- d. 4213

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15. Adding salt to water makes it salty. Which of the following statement is true regarding this change?

- a. It is a chemical change because a new substance is formed.
- b. It is a physical change because the original substances can be recovered.
- c. It is a chemical change because there is an exchange of heat.
- d. It is a physical change because there is a slight change in colour.

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16. A metal plate of area  $250 \text{ cm}^2$  is to be coated on both sides by Cu. How long will it take to deposit Cu  $0.01 \text{ cm}$  in thickness if a current of  $1.5 \text{ A}$  is used? ECE of Cu =  $0.00033 \text{ g/C}$  and density of Cu =  $9 \text{ g/cm}^3$ .

- a. 25.25 hours
- c. 14.38 hours

- b. 47.53 hours
- d. 21.47 hours

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17. In the given question, an assertion and a reason are given. Choose the correct option:

**Assertion:** During the solar eclipse, people living on the earth find their view of the sun blocked.

**Reason:** Solar eclipse happens when the earth passes directly between the sun and the moon.

- a. Both assertion and reason are true and the reason is the correct explanation of assertion.
- b. Both assertion and reason are true, but the reason is not a correct explanation of the assertion.
- c. The assertion is correct, but the reason is incorrect.
- d. Both assertion and reason are incorrect.

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18. In the given question, an assertion and a reason are given. Choose the correct option:

**Assertion:** Horticulture is a branch of agriculture that deals with the production of vegetables, fruits, flowers and decorative flowers.

**Reason:** Horticulture is similar to agriculture in many ways, but it is usually carried out on a smaller scale.

- a. Both assertion and reason are true and reason is the correct explanation of assertion.
  - b. Both assertion and reason are true, but reason is not a correct explanation of the assertion.
  - c. Assertion is correct, but reason is incorrect.
  - d. Both assertion and reason are incorrect.
-

**19.** Read the given statements and select the option that correctly fills the blanks in any two of them:

- The zygote divides the number of times and forms a hollow ball-like structure called a. It moves down and gets implanted in the uterus. It starts developing body parts and at this stage it is called b.
- c is the period in life when a girl or a boy attains sexual maturity.
- Production of sex hormones is under the control of d gland.
- Metamorphosis in frog requires the presence of e in water to produce thyroxine hormone.

a. a - Fetus, b - Thymus

b. b - Embryo, d - Pituitary

c. c - Adolescence, e - Calcium

d. b - Fetus, c - Senescence

**20.** Four students made the following statements:

David: Coal, petroleum and natural gas are called fossil fuels.

Michael: Coal and natural gas are two exhaustible substances.

Richard: Coke is used in the manufacture of steel.

Ron: Fossil fuels are present in limited quantities.

Which of them is/are incorrect?

a. Only Richard

b. Only Michael

c. Both David and Ron

d. None of them is incorrect

**21.** Match the column I with column II:

Column I		Column II	
P.	Ceres	1.	Comet
Q.	Halley	2.	Satellite
R.	Big dipper	3.	Asteroid
S.	Mercury	4.	Constellation

a. P - 3, Q - 1, R - 4, S - 2

b. P - 3, Q - 1, R - 2, S - 4

c. P - 1, Q - 4, R - 2, S - 3

d. P - 4, Q - 3, R - 1, S - 2

**22.** Daniel observed three different kinds of cells. A, B and C. He noted down the observed data in a table, as shown below. Study the information table and select the correct statement:

Cell organelles observed	Cell 'A'	Cell 'B'	Cell 'C'
Cell wall	Yes	No	Yes
Cell membrane	Yes	Yes	Yes
Cytoplasm	Yes	Yes	Yes
Chloroplast	No	No	Yes
Nucleus	Yes	Yes	Yes

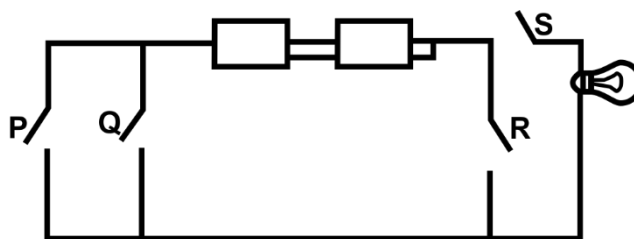
a. Cell B has an irregular shape but not cells A and C.

b. Only Cell B is able to undergo cell division.

c. Cell C is a smaller unit of life than cell A or Cell B.

d. Cell A is a plant cell but cells B and C are animals cells.

23. In the given diagram, which two switches must be closed for the bulb to light up?



- |            |            |
|------------|------------|
| a. P and Q | b. Q and S |
| c. R and S | d. Q and R |

24. Consider the following statements and choose the correct option:

Statement 1: Horse has to pull the cart harder during the first few steps of motion.

Statement 2: The limiting friction is more than the dynamic friction.

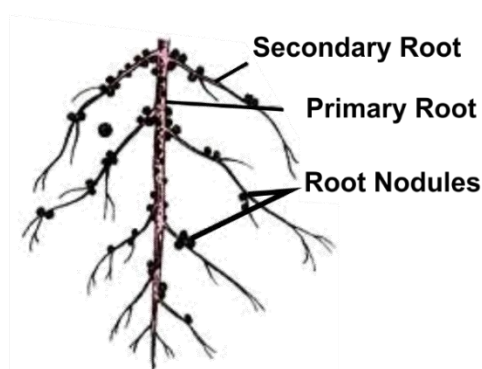
- Both the statements are correct and statement 2 is the correct explanation of statement 1.
- Both the statements are correct but statement 2 is not the correct explanation of statement 1.
- Statement 1 is correct but statement 2 is incorrect.
- Statement 1 is incorrect but statement 2 is correct.

25. Consider the following statements and choose the correct option:

- Fertilisers may leach into soil to poison groundwater.
- Water logging stands to be the best method of irrigation.
- Farmers put up scarecrows to keep away locusts.
- Weeding is a process of growing weeds in a field.

- |  |                                     |
|--|-------------------------------------|
| a. Only statement 1 is correct         | b. Only statement 3 is correct      |
| c. Both statements 1 and 2 are correct | d. Statement 2, 3 and 4 are correct |

26. The given figure shows root nodules in a plant. Identify the statement that is not related to the given figure:



- The root nodules contain nitrogen-fixing bacteria such as Rhizobium which perform biological nitrogen fixation.
- Association between the leguminous plants and nitrogen-fixing bacteria is referred to as symbiosis.
- The nitrogen-fixing bacteria convert atmospheric free nitrogen into nitrogenous compounds such as nitrates.
- We need to add more fertilisers to such crops to improve the growth of nitrogen-fixing bacterium.

27. Plants manufacture their own supplies of carbohydrates. What are the raw materials and the waste product of this process?

	Raw materials	Waste products
A.	Carbon dioxide and chlorophyll	Oxygen
B.	Carbon dioxide and water	Oxygen
C.	Oxygen and chlorophyll	Carbon dioxide
D.	Oxygen and water	Carbon dioxide

- a. A  
c. C
- b. B  
d. D
- 

28. To make two bodies A and B experience an equal acceleration, forces 6 N and 4 N are applied, respectively. If the bodies are combined, then to produce the same acceleration, the force applied should be \_\_\_\_\_ N.

- a. 1  
c. 6
- b. 3  
d. 10
- 

29. If the velocity of sound wave is  $330 \text{ m s}^{-1}$  and the frequency of oscillations is 10 Hz, then the distance between an adjacent compression and rarefaction is \_\_\_\_\_ m.

- a. 33  
c. 12.5
- b. 16.5  
d. 44
- 

30. Two identical copper coins are melted and two wires 'A' and 'B' are made out of them. What is the resistance of B, if the length of A is twice that of B?

- a. Equal to the resistance of A  
c. Equal to quarter the resistance of A
- b. Equal to half the resistance of A  
d. Equal to 1/8 times the resistance of A
- 

31. Fill in the blank:

Peter took an iron stand with a hook and tied one end of cotton thread with the hook. He then tied the weights on the other end of the thread and kept increasing the weight until the thread broke. He repeated the process with the other threads, i.e., wool and nylon. The total weight required to break the thread will be maximum in \_\_\_\_\_.

- a. cotton, followed by nylon and finally by wool  
b. nylon, followed by wool and finally by cotton  
c. wool, followed by nylon and finally by cotton  
d. cotton, followed by wool and finally by nylon
-



32. Which of the following statements is incorrect?

- a. Anthrax is a bacterial disease that affects humans and cattle.
- b. Rust of wheat is a viral disease that is spread by air.
- c. Citrus canker is a bacterial disease that affects citrus fruits.
- d. Yellow vein mosaic is a viral disease that affects bhindi.

33.  $V_V$ ,  $V_R$ ,  $V_G$  are the velocities of a violet, red and green light respectively passing through a prism after the dispersion of white light. Which among the following is a correct relation?

- a.  $V_V = V_R = V_G$
- b.  $V_V > V_R > V_G$
- c.  $V_V < V_G < V_R$
- d.  $V_V < V_R < V_G$

34. Which of the following statements is correct about the inflammable substances?

- a. They have a low ignition temperature and cannot catch fire easily.
- b. They have a high ignition temperature and can catch fire easily.
- c. They have a low ignition temperature and can catch fire easily.
- d. They have a high ignition temperature and cannot catch fire easily.

35. In the following question, an assertion and a reason are given. Choose the correct option:

**Assertion:** Carbon monoxide results from incomplete combustion of fuels such as petrol.

**Reason:** The quantity of oxygen needed for complete combustion is twice of oxygen needed for complete combustion resulting in the formation of CO.

- a. Both assertion and reason are correct and the reason is the correct explanation of the assertion.
- b. Both assertion and reason are correct, but the reason is not the correct explanation of the assertion.
- c. The assertion is correct, but the reason is incorrect.
- d. The assertion is incorrect, but the reason is correct.

36. To reach the same height on the moon as on the earth, a body must be projected up with:

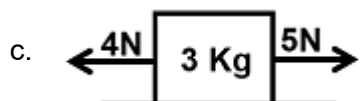
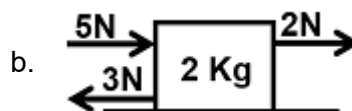
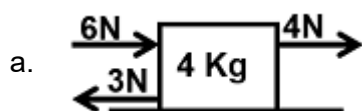
- a. higher velocity on the moon
- b. lower velocity on the moon
- c. same velocity on the moon and earth
- d. it depends on the mass of the body

37. Match the following:

	Column I		Column II
A.	Xylem	p.	Transpiration
B.	Phloem	q.	Transport of food
C.	Root hair	r.	Transport of water
D.	Stomata	s.	Absorption of water

- a. A - (p); B - (q); C - (r); D - (s)
- b. A - (q); B - (r); C - (p); D - (s)
- c. A - (r); B - (q); C - (s); D - (p)
- d. A - (r); B - (q); C - (p); D - (s)

38. In the following figures illustrated below, identify the body which remains stationary:

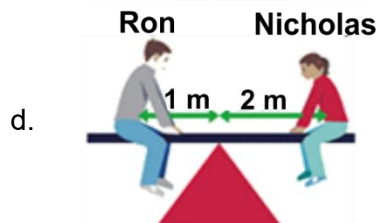
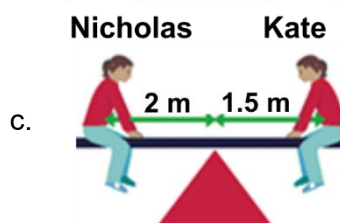
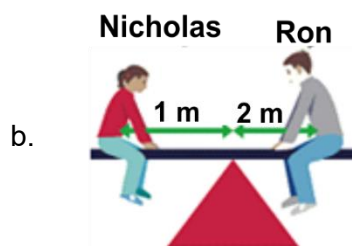
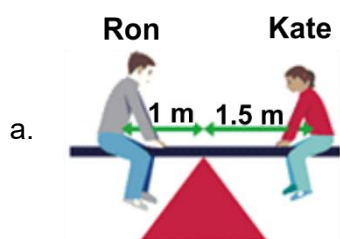


d. None of the above

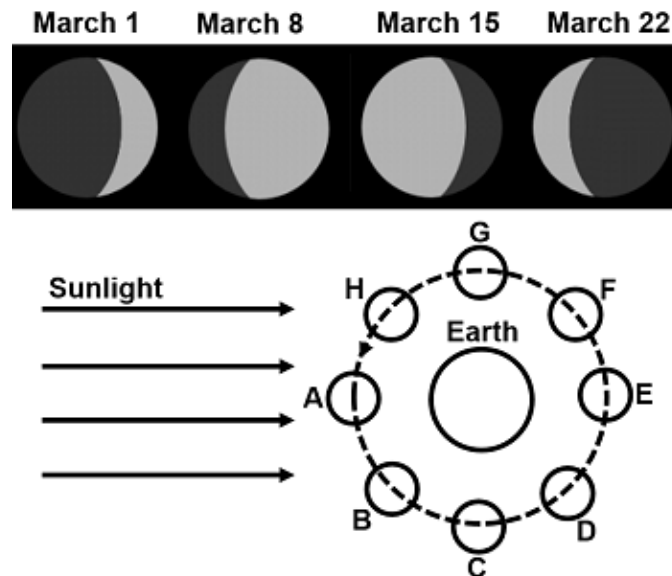
39. The table shows the weights of three students sitting on a see-saw.

Student	Weight/N
Ron	800
Nicholas	400
Kate	400

In which of the following figures is the see-saw in equilibrium?



40. The sketches show the phases of the Moon one week apart. The diagram shows the Moon's orbit around the Earth. Use the diagram and the sketches to answer the questions below:
- At which letter on the diagram a full moon might occur?
  - Which letter on the diagram shows the positions of the Moon on March 8?
  - Approximately when was the Moon full?



- (i) E, (ii) D, (iii) May 11
- (i) A, (ii) B, (iii) May 4
- (i) C, (ii) A, (iii) May 18
- (i) F, (ii) C, (iii) May 29

### Scholar Section (Each Question is 2 Marks)

41. Body A of mass 2 kg and another body B of mass 4 kg on the same material are kept in the same sunshine for some time interval. If the rise in temperature is equal for both bodies, then which one among the following in this regard is correct?
- Heat absorbed by B is double because its mass is double.
  - Heat absorbed by A is double because its mass is equal.
  - Heat absorbed by both A and B is equal because the quantity of heat absorbed does not depend upon mass.
  - Heat absorbed by B is four times than the heat absorbed by A because the quantity of heat absorbed is proportional to the square of the mass.
42. The teacher asked Leo to perform an activity to test the presence of starch in leaves. Leo wrote the steps randomly and is now confused as to how the activity is to be done. Help him perform the activity by arraigning the steps in the correct sequence:
- Pour dilute iodine solution on the leaf.
  - Boil the leaf in alcohol.
  - Pluck the green leaf from the plant.
  - Wash the leaf with water to remove chlorophyll.
  - Blue-black colour
- C → A → E → B → D
  - C → B → E → D → A
  - C → B → D → A → E
  - E → B → C → D → A

43. A ball is cut into two halves. On the outer surface of one half of the ball, a shiny aluminium foil is pasted. A bulb is now placed in front of this shiny surface. The image of the bulb formed by the shiny surface is:

a. virtual and smaller in size	b. real and smaller in size
c. virtual and bigger in size	d. real and bigger in size

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44. Kate and Ron noticed that the leaves of the lily flower had a layer of wax on them. Ron explained that the wax prevents the water from collecting on them and causes them to drown. Kate wondered how then they got the gases they needed for breathing. Which of the following is the correct answer to her question?

a. They get the gases they need from the water they float on.  
b. They breathe through the flowers they produce.  
c. They do not need any gas to live.  
d. They can move their leaves above the water regularly for gaseous exchange.

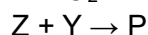
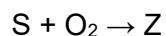
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45. A batsman hits a cricket ball which then rolls on level ground. After covering a short distance, the ball comes to rest. Why does the ball slow down to stop?

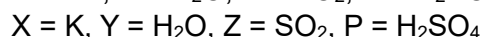
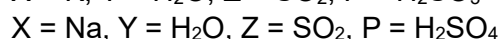
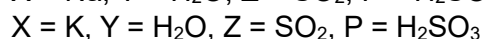
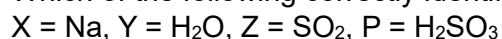
a. The batsman did not hit the ball hard enough.  
b. Velocity is proportional to the force exerted on the ball.  
c. There is a force on the ball opposing the motion.  
d. There is no unbalanced force on the ball, so the ball would come to rest.

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46.  $2X + 2Y \rightarrow 2XOH + H_2$



Which of the following correctly identifies X, Y and Z?



a. Only 1	b. Only 2
c. Both 1 and 2	d. Both 2 and 4

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47. Consider the following parts of the cytoplasm of a cell. Choose the option that correctly categorises them:

**Endoplasmic reticulum, Ribosomes, Lysosomes, Centrosomes, Plastids, Vacuoles, Fat droplets, Mitochondria, Granules, Golgi apparatus**

- Living parts** - Endoplasmic reticulum, Ribosomes, Mitochondria, Golgi apparatus, Lysosomes, Centrosome, Plastids  
**Non-living parts** - Granules, Fat droplets, Vacuoles
- Living parts** - Granules, Fat droplets, Vacuoles  
**Non-living parts** - Ribosomes, Mitochondria, Lysosomes
- Living parts** - Endoplasmic reticulum, Fat droplets, Centrosome  
**Non-living parts** - Granules, Plastids, Vacuoles
- Living parts** - Granules, Plastids, Vacuoles  
**Non-living parts** - Endoplasmic reticulum, Fat droplets, Centrosome

48. The time period of a pendulum on the surface of a planet is 8 s and the same simple pendulum is a seconds pendulum on the Earth surface. What is the value of x, if the acceleration due to gravity of the planet is  $1/x$  times of that of the earth?

- 16
- 8
- 4
- 2

49. Consider the following features of a process and identify that process:

- This process can be carried out with or without a catalyst.
- This process is carried out to meet the increasing demand of gasoline.
- In this process, higher hydrocarbons break down to give smaller hydrocarbons.

- Refining
- Destructive distillation
- Cracking
- Reforming

50. Four children made some comments based on the flow chart given:

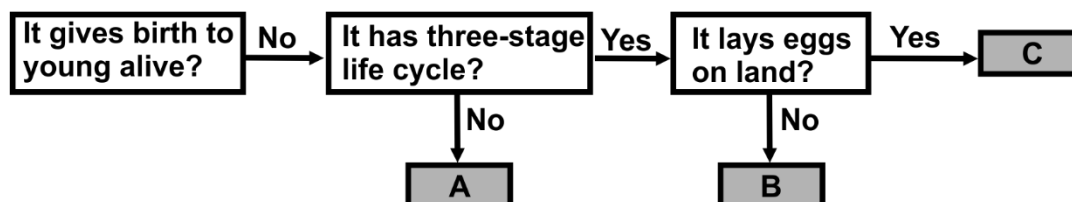
Richard: Animals A, B and C do not give birth to young alive.

Susan: Animal A has three stages in its life cycle but Animal B had four stages.

Jack: Both animals A and C lay eggs on land.

Sam: Animal B does not lay its eggs on land and has three stages in its life cycle.

Who had made the wrong comments?



- Richard
- Susan
- Jack
- Sam

## Answer Key

1.	d	2.	a	3.	a	4.	c	5.	c	6.	a	7.	b
8.	c	9.	d	10.	a	11.	d	12.	b	13.	c	14.	c
15.	b	16.	a	17.	c	18.	b	19.	b	20.	d	21.	a
22.	a	23.	b	24.	a	25.	a	26.	d	27.	b	28.	d
29.	b	30.	c	31.	b	32.	b	33.	c	34.	c	35.	b
36.	b	37.	c	38.	d	39.	d	40.	a	41.	a	42.	c
43.	a	44.	a	45.	c	46.	c	47.	a	48.	a	49.	c
50.	b												