UNICUS OLYMPIADS

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Sample Paper

Class 5

Unicus Global Science Olympiad (UGSO)

Time: 60 minutes

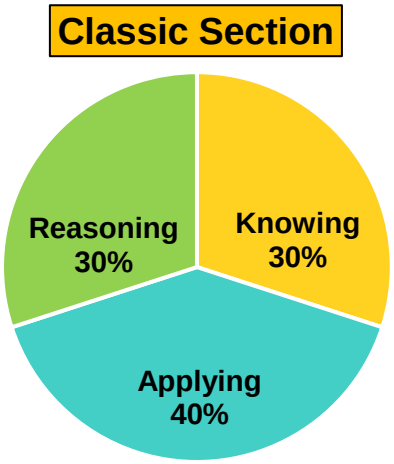
Pattern and Marking Scheme			
Section	**Total Questions**	**Marks per Question**	**Total Marks**
Classic Section	30	1	30
Scholar Section	15	2	30
Grand Total	**45**		60

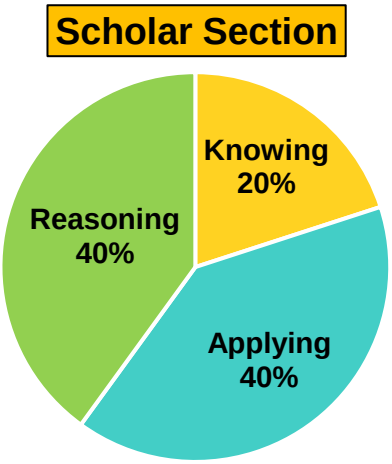
Unicus Global Science Olympiad (UGSO)

The **Unicus Global Olympiad** is organised around two dimensions:

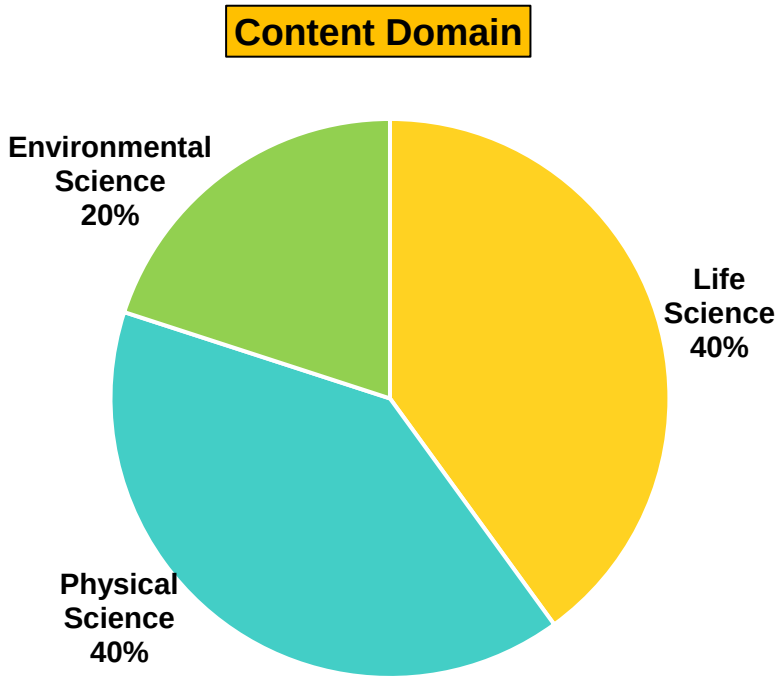
1. Content dimension, specifying the subject matter domains to be assessed
2. Cognitive dimension, specifying the thinking processes to be assessed

Target percentages of the question paper devoted to cognitive domains





Target percentages of the question paper devoted to content domains



For more details, visit https://www.unicusolympiads.com/.

Classic Section (Each Question is 1 Mark)

Cognitive Domain: Applying	Content Domain: Life Science

1. Which example best illustrates a monosexual flower?

a. A rose which has both stamens and pistils
b. A pumpkin flower, which can be either male or female
c. A tulip with both male and female parts in one flower
d. A daffodil that has petals and sepals/can self-pollinate

Cognitive Domain: Applying	Content Domain: Life Science

2. Considering the impact of feeding habits on the ecosystem, what role do carnivores play in controlling population sizes?

a. They increase the population of herbivores.
b. They decrease biodiversity.
c. They help control the population of herbivores, maintaining ecological balance.
d. They have no impact on the population of other species.

Cognitive Domain: Applying	Content Domain: Life Science

3. Which of the following adaptations would likely be found in a predator living in an open grassland ecosystem?

a. Brightly coloured fur to attract mates
b. Thick fur to insulate against cold weather
c. Large, forward-facing eyes to judge depth while hunting
d. Poor eyesight but excellent hearing

Cognitive Domain: Applying	Content Domain: Life Science

4. A certain type of beetle has a unique adaptation: it can change colour to match its surroundings. However, if the beetle is introduced into an environment where the terrain is constantly changing colours, what is the most likely outcome?

a. The beetle will lose its ability to change colour.
b. The beetle will thrive, as it can match any background.
c. The beetle may struggle to adapt quickly enough to avoid predators.
d. The beetle will evolve to become invisible.

Cognitive Domain: Knowing	Content Domain: Life Science

5. You're at the park and spot a grasshopper laying eggs in the sand. Unlike butterflies, grasshoppers undergo incomplete metamorphosis. How many distinct stages are there typically in an incomplete metamorphosis?

a. 1
b. 2
c. 3
d. 4

Cognitive Domain: Knowing	Content Domain: Life Science

6. Consider the following statements and choose if they are true or false.

1. A balanced diet includes some amount of sugar as well.
2. All bacteria cause communicable diseases.
3. Non-communicable diseases are often caused by lifestyle factors like unhealthy diet and lack of exercise.

a. 1 – False, 2 – False, 3 – True
b. 1 – True, 2 – False, 3 – True
c. 1 – False, 2 – True, 3 – True
d. 1 – True, 2 – False, 3 – False

Cognitive Domain: Applying	Content Domain: Life Science

7. You love pickles, but your friend says they're bad because of the fermentation process. What can you tell them about fermentation?

a. Fermentation spoils food and makes it unsafe to eat.
b. Fermentation creates harmful bacteria that cause illness.
c. Fermentation preserves food and creates beneficial bacteria for gut health.
d. Fermentation adds sugar and makes food taste bad.

Cognitive Domain: Reasoning	Content Domain: Life Science

8. You have three mystery bags labelled A, B, and C, each containing a different food item. Based on the following observations, identify the contents of each bag:

A. Contents of bag A dissolves in water and provides instant energy to the body.
B. Contents of bag B is insoluble, burns readily, and is essential in small amounts for the body.
C. Contents of bag C neither dissolves nor burns readily but acts as building blocks for the body.

a. A: Salt, B: Fats, C: Carbohydrates
b. A: Mineral, B: Vitamin, C: Fibre
c. A: Sugar, B: Oil, C: Protein
d. A: Protein, B: Starch, C: Oil

Cognitive Domain: Knowing	Content Domain: Life Science

9. You accidentally cut your finger. Blood starts flowing from the wound.
Based on the circulatory system, which part will initially carry the blood that comes out of the cut?

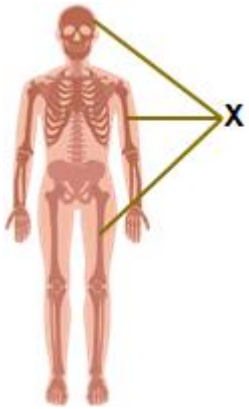
A. Capillaries
B. Arteries
C. Veins

a. A only
b. B only
c. A and B only
d. A, B and C

Cognitive Domain: Applying	Content Domain: Life Science

10. The diagram below shows the human skeletal system.
X are an integral part of the skeletal system. Identify the other parts that primarily make up the skeletal system.

A. Ligaments
B. Nerves
C. Joints
D. Cartilage



a. A and C only
b. A, C and D only
c. B, C and D only
d. A, B, C and D

Cognitive Domain: Applying	Content Domain: Life Science

11. Blood circulation is vital for transporting oxygen, nutrients, and waste products throughout the body. Veins play a crucial part in this circulation.
If a person has a blockage in their veins, what are some potential consequences for blood circulation?

a. Blood flow to the heart would increase.
b. Blood would flow more quickly through the arteries.
c. Blood flow back to the heart would be restricted.
d. There would be no change in blood circulation.

Cognitive Domain: Reasoning	Content Domain: Life Science

12. A group of children are skipping rope during gym class.
Which of the following statements best explains what happens to the children's skeletal system when they skip rope?

A. The cartilage in their knees breaks down due to the impact.
B. The muscles in their legs contract and relax, causing the bones to move.
C. The calcium in their bones is depleted because of the energy used.

a. A only
b. B only
c. A and B only
d. A, B and C

Cognitive Domain: Applying	Content Domain: Physical Science

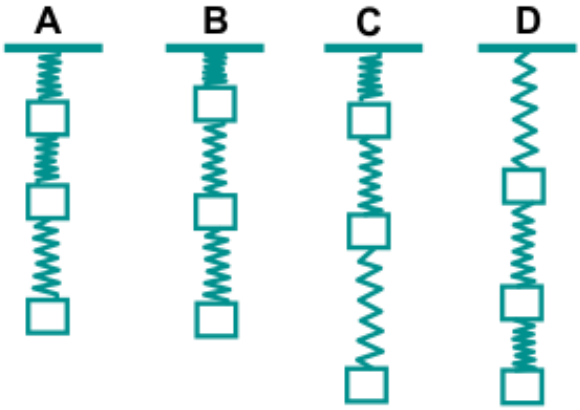
13. Force is a push or pull that can cause an object to change its state of motion (rest or movement). It can also affect the shape or size of an object.
Which of the following is/are NOT an example of the effect(s) of a force acting on an object?

A. A metal ball blocks sunlight
B. A flag waves in strong wind
C. A car comes to a stop at a red light
D. A door remains closed because it is latched

a. A only
b. A and B only
c. A, B and C only
d. A, B, C and D

Cognitive Domain: Reasoning	Content Domain: Physical Science

14. A student hung three identical springs from the ceiling, as shown in the image. Each spring was attached to an object of exactly the same mass
Which of the following observations (A, B, C or D) is most like for the student to make?



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

Cognitive Domain: Applying	Content Domain: Physical Science

15. Jake's dad is trying to find a faster way to cook meals in the morning. He plans to experiment by cooking the same dish in two different cooking vessels: a saucepan and a cooker. Based on the different cooking methods, which cooking vessel would likely cook the dish faster and why?

a. Saucepan, because it uses direct heat on the bottom of the pan.
b. Cooker, because it uses a smaller cooking space, requiring less heat.
c. Cooker, because it uses a sealed environment, trapping heat and steam.
d. Both will take the same amount of time because they are cooking the same dish.

Cognitive Domain: Reasoning	Content Domain: Physical Science

16. You are tasked with designing a frying pan. The table below shows some characteristics of four materials.
Which material would be the most suitable for the bottom of the frying pan?

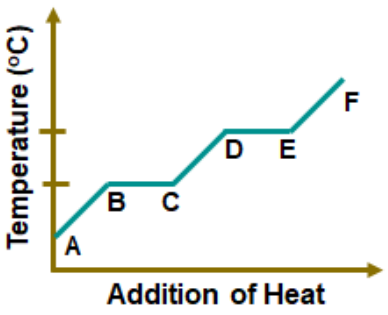
Characteristic	Material A	Material B	Material c	Material D
Brittle	Yes	No	Yes	Yes
Conducts heat	No	Yes	Yes	Yes
Non-reactive	No	Yes	No	Yes

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

Cognitive Domain: Reasoning	Content Domain: Physical Science

17. Look at the graph showing the heating of water. The curve shows how the temperature of the water changes as heat is added. In which part of the curve would you find the following:

	Ice and liquid water present at the same time	Liquid water and stream present at the same time
A.	AB	CD
B.	BC	DE
C.	CD	DE
D.	DE	EF



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

Cognitive Domain: Knowing	Content Domain: Physical Science

18. Consider the following statements and choose if they are true or false.

1. The sharper a wedge, the less force is needed to split an object.
2. A seesaw is in perfect balance only when the two people sitting on it have the same weight.
3. Simple machines can create new energy, but they cannot reduce the amount of work required to complete a task.

a. 1 – True, 2 – True, 3 – False
b. 1 – True, 2 – False, 3 – False
c. 1 – False, 2 – True, 3 – True
d. 1 – True, 2 – True, 3 – True

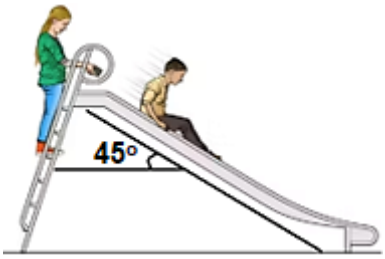
Cognitive Domain: Applying	Content Domain: Physical Science

19. You are helping your friend open a tight jar lid. Which simple machine principle would be most helpful, and why?

a. Inclined plane: It provides a gradual incline to lift the lid.
b. Wedge: It can be inserted under the lid to pry it open.
c. Screw: It creates a rotational force to twist the lid.
d. Pulley: It increases the pulling force applied to the lid.

Cognitive Domain: Reasoning	Content Domain: Physical Science

20. A playground slide is a ramp or inclined plane that children slide down. The park authority wants to install a new slide with the same length and material but a shallower angle (40°) compared to the existing slide (45°) shown in the picture.
How will the speed of a child compare on the new slide versus the old slide?



a. The child's speed will be nearly identical on both slides due to same length.
b. The child will reach a higher speed on the new slide due to a reduced angle.
c. The child's weight will be the determining factor in how fast they slide down.
d. The new slide's material will make the child slide slower due to increased friction.

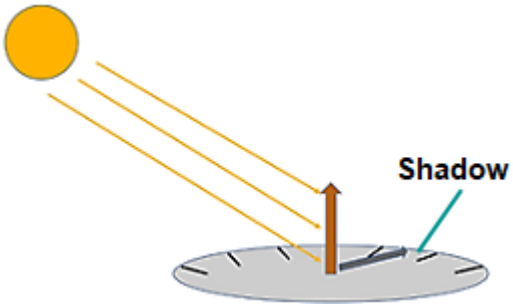
Cognitive Domain: Knowing	Content Domain: Physical Science

21. A class experiment involves placing different materials in a beam of light to study their shadows. Which of the following results would be unexpected?

a. No shadow with clear glass
b. A faint shadow with frosted glass
c. A dark shadow with cardboard
d. A dark shadow with clear glass

Cognitive Domain: Applying	Content Domain: Physical Science

22. Noah is building a sundial to tell time in his backyard. He positions a stick upright in the ground and observes the shadow it casts throughout the day. How does the movement of the Earth affect the position of the shadow throughout the day?



a. The shadow movement is caused by the changing weather patterns, not Earth's movement.
b. The Earth's revolution around the sun changes the sun's distance, affecting the shadow length.
c. The Earth's tilt on its axis doesn't affect the position of the shadow throughout the day.
d. The Earth's rotation causes the sun's position to change in the sky, affecting the shadow direction.

Cognitive Domain: Reasoning	Content Domain: Physical Science

23. Ava is drawing in her room. Sunlight shines through the window and falls directly on her drawing paper. She places a transparent glass vase in front of the window, blocking some of the sunlight. Based on the information about the setup, what kind of shadow will the glass vase cast on the drawing paper?

a. A completely dark and solid shadow
b. A faint and blurry outline of the vase
c. The solid shadow will be the same colour as the vase
d. No shadow at all

Cognitive Domain: Knowing	Content Domain: Physical Science

24. Which object vibrates the fastest to produce a high-pitch and shrill sound?

a. A large drum
b. A car horn
c. A whistle
d. A thunderclap

Cognitive Domain: Knowing	Content Domain: Environment Science

25. You hear a loud roar outside and see a dark cloud of ash rising in the distance. What natural phenomenon might this be a warning sign of?

a. A heatwave
b. A blizzard
c. A volcanic eruption
d. An earthquake

Cognitive Domain: Knowing	Content Domain: Environment Science

26. Which of the following materials is MOST LIKELY used as the surface layer of a road you walk on?

a. Bauxite ore
b. Fine sand
c. Asphalt
d. Large cobblestones

Cognitive Domain: Reasoning	Content Domain: Environmental Science

27. Many animals play crucial roles in maintaining healthy ecosystems. Which of the following scenarios most likely depicts an animal having a positive impact on the ecosystem?

a. 

b. 

c. 

d. 

Cognitive Domain: Applying	Content Domain: Environmental Science

28. If a local ecosystem is losing its plant biodiversity due to pollution, what would likely be the immediate impact on the ecosystem?

a. A decrease in primary consumer populations due to less available food.
b. An increase in primary consumer populations due to fewer predators.
c. A significant increase in producer populations due to reduced competition.
d. No significant impact, as ecosystems can quickly adapt to changes in plant biodiversity.

Cognitive Domain: Applying	Content Domain: Environmental Science

29. Imagine a garden with a healthy population of ladybugs, aphids (tiny insects that eat plants), and roses. If all the ladybugs suddenly disappeared, what would MOST LIKELY happen to the roses over time?

a. The number of aphids would increase damaging the bushes.
b. The roses would receive more sunlight.
c. The roses would grow taller and stronger.
d. The number of rose bushes would stay the same.

Cognitive Domain: Knowing	Content Domain: Environmental Science

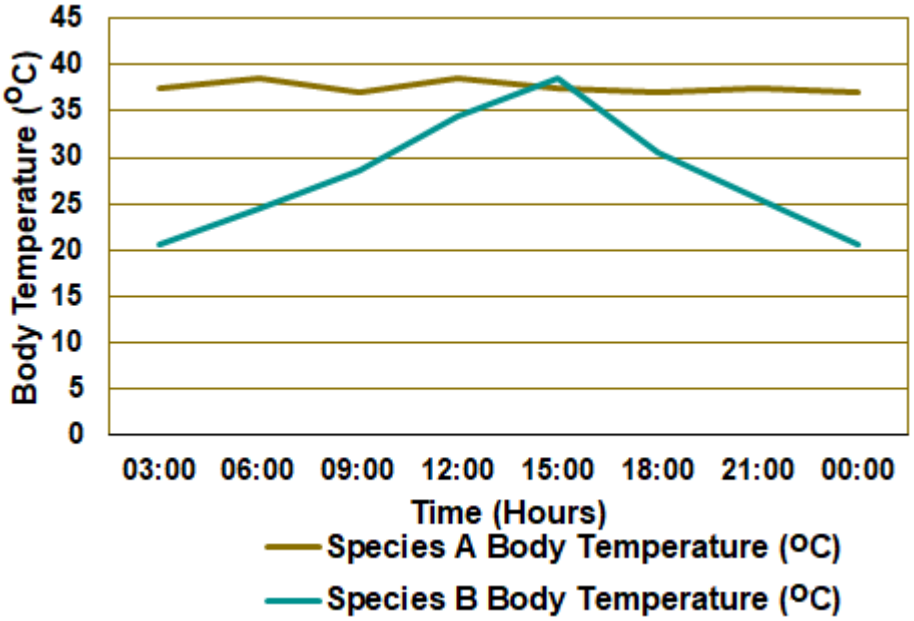
30. In an ecosystem, organisms have different roles. Which of the following is NOT a correct match of the organism to its ecological role?

a. Bees - Pollinators
b. Algae - Producers
c. Wolves - Decomposers
d. Earthworms - Decomposers

Scholar Section (Each Question is 2 Marks)

Cognitive Domain: Applying	Content Domain: Life Science

31. Researchers monitored the body temperature of two species of animals, A and B, over a 24-hour. The results are shown in the graph below.
Which of the following is the MOST LIKELY classification for species A and B?



a. A: Reptile, B: Mammal
b. A: Mammal, B: Reptile
c. A: Mammal, B: Birds
d. A: Amphibians, B: Reptiles

Cognitive Domain: Applying	Content Domain: Life Science

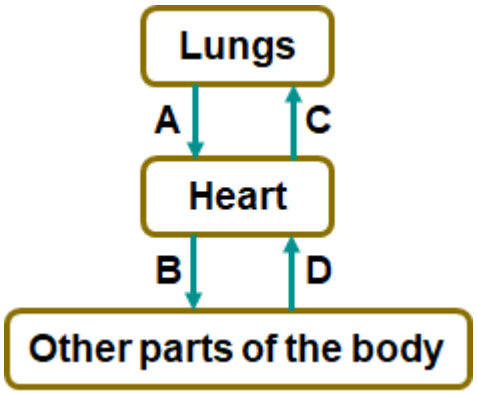
32. Michael coughed several times during lunch and didn't cover his mouth. What is the MOST LIKELY way his classmates could catch his cold?

A. By sharing a pencil with Michael.
B. By sitting next to Michael in class.
C. By shaking Michael's hand.

a. A only
b. A and B only
c. B and C only
d. A, B and C

Cognitive Domain: Reasoning	Content Domain: Life Science

33. A healthy individual underwent blood tests. Samples were taken from four different blood vessels (A, B, C, and D) carrying blood to and from the lungs, heart, and other body parts as shown in the diagram below. Which of the following graphs accurately shows the carbon dioxide content of each sample?



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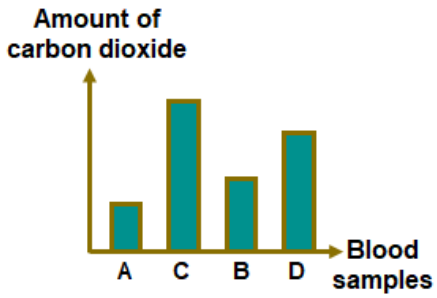

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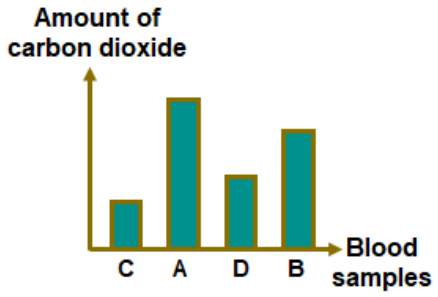

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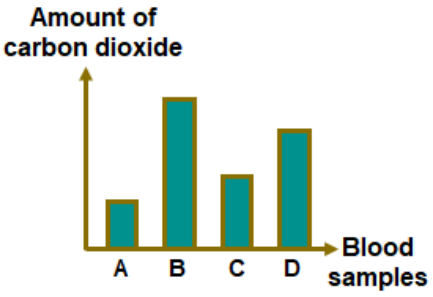
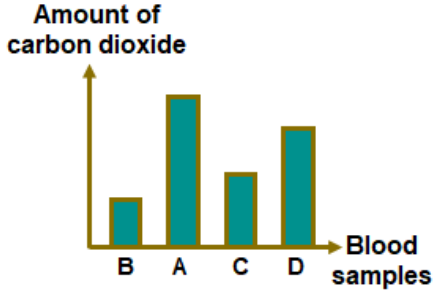


d.


Cognitive Domain: Knowing	Content Domain: Physical Science

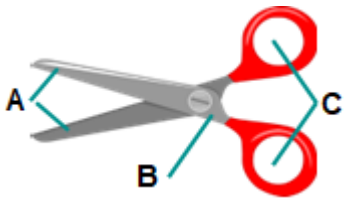
34. Match the following separation techniques with their descriptions.

	Separation Technique		Description
1.	Filtration	**A.**	Separating a mixture based on the colour of its components
2.	Evaporation	**B.**	Separating a liquid from a dissolved solid
3.	Distillation	**C.**	Removing a liquid by heating it to its boiling point
4.	Chromatography	**D.**	Removing a solid from a liquid

a. 1 - D, 2 - B, 3 - C, 4 - A
b. 1 - D, 2 - C, 3 - B, 4 - A
c. 1 - A, 2 - B, 3 - C, 4 - D
d. 1 - B, 2 - D, 3 - C, 4 - A

Cognitive Domain: Applying	Content Domain: Physical Science

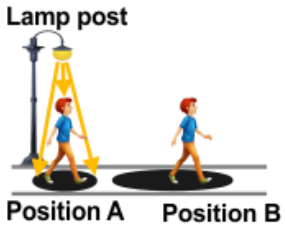
35. Scissors are a common tool that uses the principle of a lever to cut paper.
The lever principle allows us to apply a small effort force to move a larger load force. Look at the picture given below and identify the effort force, the load force, and the fulcrum.



a. A: Effort, B: Fulcrum, C: Load
b. A: Effort, B: Load, C: Fulcrum
c. A: Load, B: Fulcrum, C: Effort
d. A: Fulcrum, B: Load, C: Effort

Cognitive Domain: Reasoning	Content Domain: Physical Science

36. Daniel is walking along a flat pavement at night. He's currently at position A and is walking towards position B. There's a street lamp above him.
Considering the direction of Daniel's walk and the light source above, which option accurately depicts the shadow formed by Daniel?

a.


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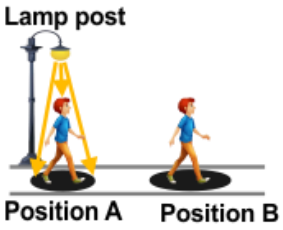

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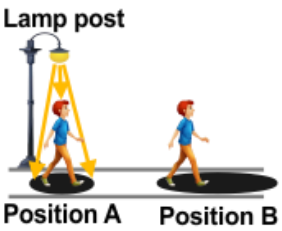
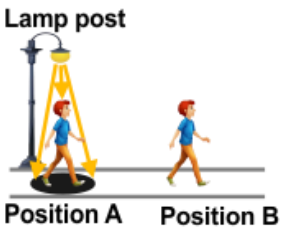


d.


Cognitive Domain: Applying	Content Domain: Physical Science

37. A scientist sets up an experiment with a bell placed inside a sealed vacuum chamber. The bell is rung while air is present in the chamber. What happens to the sound of the bell when the air is pumped out of the chamber?

a. It gets louder.
b. It gets quieter.
c. It remains the same.
d. It cannot be heard.

Cognitive Domain: Applying	Content Domain: Environmental Science

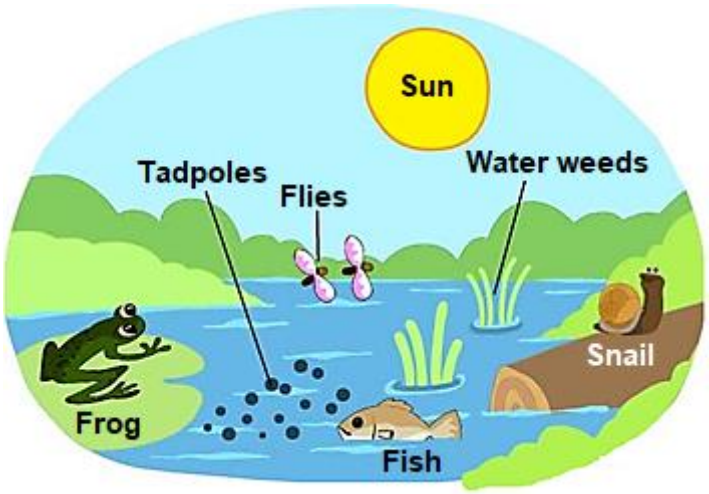
38. You are a geologist studying three rock samples collected in the field. Sample A is smooth and glassy, Sample B is rough and grainy, and Sample C is banded and sparkly. To identify the rock type of these samples, which of the following properties would be helpful?

A. Density of the rock
B. Texture of the rock
C. The location where the rock was found

a. A only
b. A and B only
c. B and C only
d. A, B and C

Cognitive Domain: Reasoning	Content Domain: Environmental Science

39. The picture below shows a simple pond ecosystem. The organism shown depend on each other for food and energy. Based on the food web, what is the MOST LIKELY source of food for the frog?



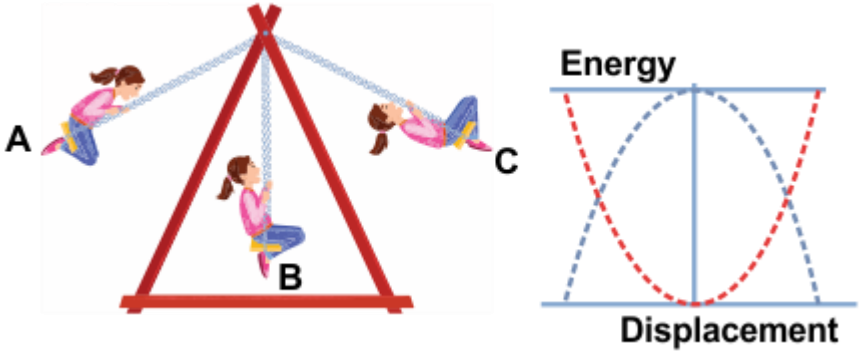
a. Water weeds only
b. Flies and small fishes
c. Snails and tadpoles
d. Flies only

Direction (for questions 40 to 42): Consider the passage given below and answer the following question:

The Mechanics of a Swing

The simple act of swinging on a playground swing involves several principles of physics, notably those relating to force, work, and energy. As a child starts swinging, they initially exert a force by pushing off the ground. This action imparts kinetic energy to the swing, allowing it to move forward. As the swing reaches the peak of its arc, the kinetic energy is converted into potential energy. At the highest point, the speed is momentarily zero as all the kinetic energy has been transformed.

The accompanying diagram illustrates the transfer of energy throughout the swing's motion, showing kinetic energy (KE) and potential energy (PE) at various points. Additionally, the graph given below plots these energy transformations against time, helping visualise how energy shifts between kinetic and potential forms during the swing's motion.



Cognitive Domain: Applying	Content Domain: Physical Science

40. The passage mentions air resistance is negligible. In reality, how does air resistance affect the swing over time?

a. It increases the swing's speed.
b. It makes the swing go higher.
c. It has no effect on the swing's motion.
d. It causes the swing to slow down gradually.

Cognitive Domain: Reasoning	Content Domain: Physical Science

41. Refer to the diagram and graph given below. What does the momentary zero speed at the highest point of the swing's arc demonstrate about the relationship between kinetic and potential energy?

A. Potential energy is maximal when kinetic energy is zero
B. Kinetic energy is maximal when potential energy is minimal
C. Kinetic energy and potential energy are independent of each other

a. A only
b. B only
c. C only
d. A and C only

Cognitive Domain: Applying	Content Domain: Physical Science

42. Which scenario demonstrates a conversion of energy similar to the way a swing's kinetic energy changes to potential energy and back again?

A. A ball rolling down a hill gains speed due to gravity
B. Working of a grandfather clock
C. A light bulb heats up and emits light as electricity
D. A toy car with a wound-up spring starts moving when released

a. A and B only
b. B only
c. C and D only
d. B and D only

Direction (for questions 43 to 45): Consider the passage given below and answer the following question:

The Mystery of the Travelling Seeds

Have you ever wondered how a tiny seed, lighter than a feather, can travel across vast distances to sprout into a new plant? Unlike animals, plants can't simply pick up and move! But that doesn't stop them from conquering new territories. Plants have developed clever tricks to hitch rides on the wind, hitch ride with animals, or even travel by water!

Imagine a field of fluffy dandelions, their white seed heads bobbing in the breeze. Each seed has a feathery parachute attached, allowing it to catch the wind and soar through the air. Some seeds, like maple helicopters, have wings that spin as they fall, helping them to travel further away from the parent plant.

But not all seeds take to the skies! Animals like squirrels and jays love to collect and bury acorns and nuts for later meals. Sometimes, they forget their stashes, and voila - a new oak tree or nut tree sprouts in a completely different location! Other seeds have developed hooks or burrs that cling to fur or feathers, ensuring they get a free ride on an unsuspecting animal's back.

Even water plays a role in seed dispersal. Coconut palms, with their buoyant shells, can float across oceans for incredible distances before landing on a new shore. Many water lilies and mangroves have seeds that are encased in waterproof coats, allowing them to travel down rivers and streams.

So, the next time you see a dandelion seed floating on the breeze, remember, it's on an exciting adventure to find a new home!

Cognitive Domain: Knowing	Content Domain: Life Science

43. After observing seeds disperse via different methods in the passage, which of the following conclusions can be most accurately drawn about the importance of seed dispersal?

a. It helps in only spreading seeds to new locations.
b. It aids in the decorative scattering of seeds without ecological benefits.
c. It is crucial for maintaining plant populations and biodiversity.
d. It primarily functions to reduce the population of parent plants.

Cognitive Domain: Applying	Content Domain: Life Science

44. A maple tree loses its seeds in the fall when there is little wind. Does this suggest that wind dispersal is not an effective strategy for maple trees?

a. Yes, maple trees should disperse their seeds in spring when there is more wind.
b. No, maple seeds can still be carried by occasional strong winds even in fall.
c. Wind dispersal is only effective for tiny seeds, not for large seeds like maple seeds.
d. The timing of seed dispersal is not important for wind dispersal to be effective.

Cognitive Domain: Reasoning	Content Domain: Life Science

45. The passage describes several methods of seed dispersal. Based on the passage, which method would likely be most effective for dispersing seeds over the longest distances?

a. Animal dispersal with hooks and burrs
b. Wind dispersal with parachutes and wings only
c. Water and wind dispersal with buoyant and winged seeds respectively
d. Explosion or fire

Answer Key

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