

Q.1) Consider the following statements:

1. The rise and fall of the tides on Earth is caused by the Moon.
2. A person would weigh much less on the Moon as it has much weaker gravity than Earth, due to its smaller mass.
3. The Moon has quakes, which are caused by the gravitational pull of the Earth.

Which of the statements given above is/are correct?

- a) 2 and 3 only
- b) 1 and 2 only
- c) 1 and 3 only
- d) 1, 2 and 3

Q.1) Solution (d)

The rhythmic rise and fall of ocean water twice in a day is called a tide. The Earth's rotation combined with the Moon's and Sun's gravitational pull on the planet causes tides.

There are two bulges in the Earth due to the gravitational pull that the Moon exerts; one on the side facing the Moon, and the other on the opposite side that faces away from the Moon. The bulges move around the oceans as the Earth rotates, causing high and low tides around the globe.

A person would weigh much less on the Moon: The Moon has much weaker gravity than Earth, due to its smaller mass, so you would weigh about one sixth (16.5%) of your weight on Earth.

The Moon has quakes: These are caused by the gravitational pull of the Earth. Lunar astronauts used seismographs on their visits to the Moon, and found that small moonquakes occurred several kilometres beneath the surface, causing ruptures and cracks. Scientists think the Moon has a molten core, just like Earth.

Q.2) With reference planets in our solar system, consider the below statements:

1. Mercury, Venus, Earth and Mars are only the planets which are part of Inner planets.
2. Saturn orbits around the sun in a clockwise direction from east to west.
3. Mars is often considered as 'Earth's twin'.

Choose the appropriate answer from the codes given below:

- a) 1 only

- b) 1 and 2 only
- c) 2 and 3 only
- d) 1, 2 and 3

Q.2) Solution (a)

Statement (1) is correct. The inner planets (in order of distance from the sun, closest to furthest) are Mercury, Venus, Earth and Mars. After an asteroid belt comes the outer planets, Jupiter, Saturn, Uranus and Neptune.

Statement (2) is incorrect – Unlike other planets, Uranus orbits around the sun in a clockwise direction from east to west.

Statement (3) is incorrect – Venus is often considered as 'Earth's twin' because of their close proximity in size, mass (weight) and density.

Q.3) Which of the statements given below are correct?

1. Asthenosphere is associated with the upper layer of the earth's mantle (below the lithosphere) whereas Barysphere is associated with inner layer of the earth's core (below outer core)
2. The main mineral constituents of the continental mass are silica and alumina.
3. The oceanic crust mainly consists of silica and iron.

Choose appropriate answer from the codes given below:

- a) 2 and 3 only
- b) 1 and 2 only
- c) 1 and 3 only
- d) 1, 2 and 3

Q.3) Solution (b)

Statement (1) and (2) are correct. Statement (3) is incorrect as the oceanic crust mainly consists of silica and magnesium (not iron).

The main mineral constituents of the continental mass are silica and alumina. It is thus called *sial* (si-silica and al-alumina). The oceanic crust mainly consists of silica and magnesium; it is therefore called *sima* (si-silica and ma-magnesium)

The innermost layer, the core, is mainly made up of nickel and iron and is called *nife* (ni – nickel and fe – ferrous i.e. iron).

Classification based on physical state:

1. **Lithosphere:** The top most solid layer is called lithosphere. It is up to 100 km deep including crust and some portion of upper mantle.
2. **Aesthenosphere:** It is the second plastic layer under lithosphere. It stretches from 100 km to 400km.
3. **Mesosphere:** It is an intermediate layer lying from 400km to 700km in depth.
4. **Pyrosphere:** It includes semi solid lower mantle and outer liquid crust. Because of very high temperature it gets its name. 'Pyros' means fire.
5. **Barrysphere:** It is the inner most solid core of the earth stretching from 5150km to 6371km.

Q.4) Plate tectonic theory is the most accepted theory, which explains the location and movement of continents as well as formation of different landmasses. Consider the following statements regarding plates and plate tectonics:

1. Lithosphere consists only of upper crust which is floating over mantle.
2. Lithosphere is fragmented into different pieces. These pieces are called plates.
3. Pacific plate is the only major plate which is completely oceanic.
4. Theory of Plate tectonics propounded that there was a supercontinent called Pangaea and a super ocean called Panthalasa.

Which of the above statements are incorrect?

- a) 4 only
- b) 1 and 4
- c) 2 and 3
- d) 1,3 and 4

Q.4) Solution (b)

Lithosphere consists of crust and upper mantle. Continental Drift theory talks about Pangaea and Panthalassa. 2nd and 3rd statements are correct.

Q.5) Consider the following surface winds:

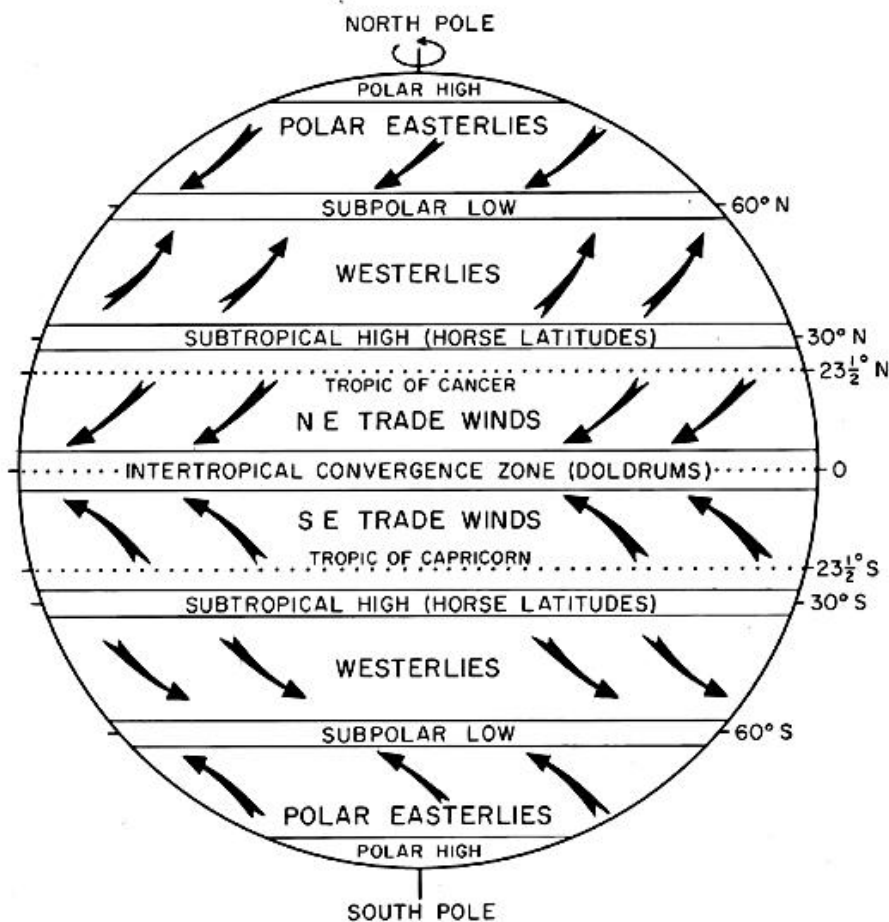
1. Doldrums
2. Trade winds
3. Westerlies
4. Polar winds

Which one among the following is the idealized global pattern of these winds from the Equator to the pole?

- a) 1-2-3-4
- b) 1-3-2-4
- c) 2-1-4-3
- d) 3-1-2-4



Q.5) Solution (a)



Q.6) Consider the following statements:

1. Places having same mean annual rainfall are joined by a line on map is called Isoneph.
2. Places having an equal degree of cloudiness are joined by lines known as Isohyet.
3. Places with equal sunshine duration joined by lines are known as Isohels.

Choose correct codes from the options given below:

- a) 1 and 2 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

Q.6) Solution (c)

- Places having same mean annual rainfall are joined by a line on map is called Isohyet.
- Places having an equal degree of cloudiness are joined by lines known as Isoneph.
- Places with equal sunshine duration joined by lines are known as Isohels.

Q.7) Identify the incorrect statement:

- a) The general movement of the currents in the northern hemisphere is clockwise and anticlockwise in the southern hemisphere.
- b) The shape and position of coasts play an important role in guiding the direction of currents.
- c) In the lower latitudes the warm currents flow on the western shores and cold on the eastern shore, while situation is reversed in higher latitudes.
- d) Convergence along which the warm and cold currents meet and divergence from which they move out in different directions also control the currents.

Q.7) Solution (c)

In the higher latitudes, the warm currents flow on the western shores and cold on the eastern shore.

Q.8) Consider the following statements:

1. Coriolis force is weakest along the equator but increases progressively towards the poles.
2. Trade winds are deflected in anti-clockwise direction in northern hemisphere and Clock-wise direction in the southern hemisphere.

Choose codes from below options:

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) None

Q.8) Solution (d)

Coriolis force is absent along the equator but increases progressively towards the poles. Trade winds are deflected in Clockwise direction in northern hemisphere and Anti-clockwise direction in the southern hemisphere.

Q.9) We know that all rocks whether igneous or sedimentary may become metamorphic or changed rocks under great heat and pressure. Consider the below lists and match List I with List II based upon the alteration they undergo:

- | List I | List II |
|--------------|--------------|
| 1. Clay | A. Slate |
| 2. Sandstone | B. Quartzite |
| 3. Limestone | C. Gneiss |
| 4. Granite | D. Schist |
| 5. Shale | E. Marble |

1-2-3-4-5

- a) A-E-C-D-B
- b) A-B-E-C-D
- c) B-A-E-C-D
- d) B-A-E-D-C

Q.9) Solution (b)

Refer chapter 2 The Earth's Crust, G.C. Leong. Self-explanatory.

Q.10) Consider the following statements:

1. When the sun, the earth and the moon are in a position of right angle, this position is called quadrature.
2. The position of the sun, the moon and the earth in a straight line is called syzygy.
3. When the position of the earth is in between the sun and moon, this is called conjunction.

Which of the statements given above is/are correct?

- a) 1 and 2 only
- b) 2 only
- c) 1 and 3 only
- d) 1, 2 and 3

Q.10) Solution (a)

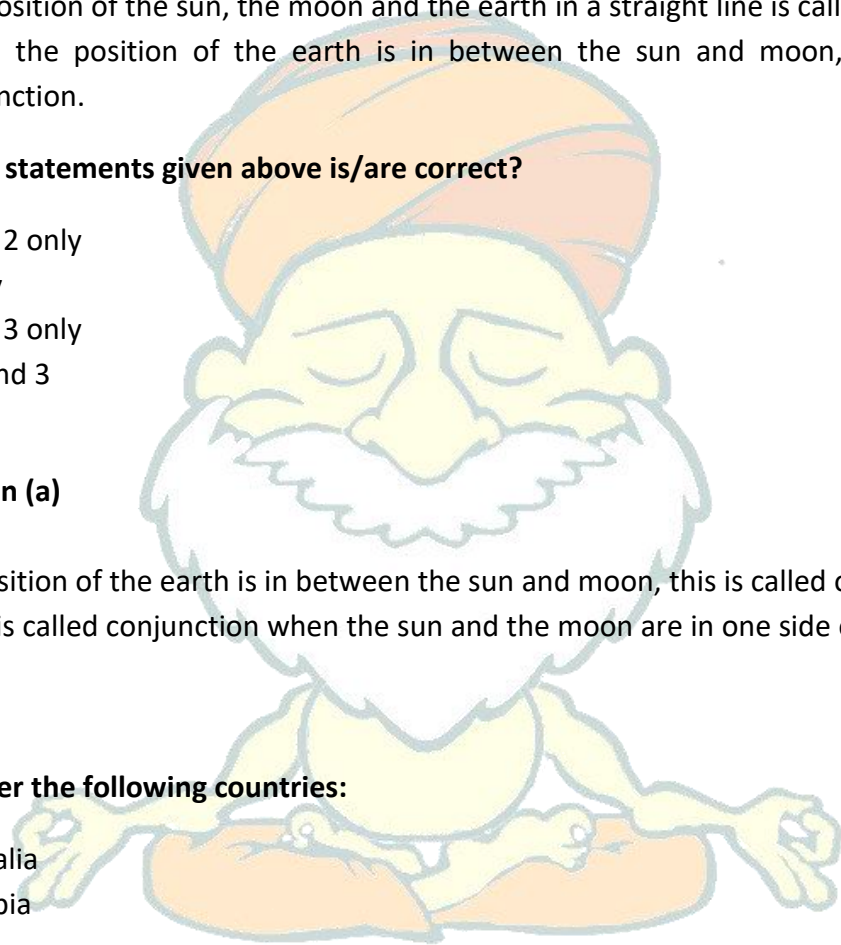
When the position of the earth is in between the sun and moon, this is called opposition. The position is called conjunction when the sun and the moon are in one side of the earth.

Q.11) Consider the following countries:

1. Australia
2. Namibia
3. Brazil
4. Chile

Through which of the above does the Tropic of Capricorn pass?

- a) 1 only
- b) 2, 3 and 4
- c) 1, 2 and 3
- d) 1, 2, 3 and 4



Q.11) Solution (d)

The **Tropic of Capricorn** line passes through Chile, Argentina, Paraguay, Brazil, Namibia, Botswana, South Africa, Mozambique, Madagascar, Australia and French Polynesia, clipping New Caledonia, Fiji, Tonga and the Cook Islands before landfall at Pitcairn.

There are 10 countries, 3 continents and 3 water bodies lies on **Tropic of Capricorn** passes.

- South America – Argentina, Brazil, Chile Paraguay
- Africa – Namibia, Botswana, South Africa, Mozambique, Madagascar
- Australia – Australia
- Water Bodies – Indian Ocean, Atlantic Ocean, Pacific Ocean

There are 16 countries, 3 continents and 6 water bodies lies on **Tropic of Cancer** passes.

- North America – Mexico, Bahamas(Archipelago)
- Africa – Niger, Algeria, Mauritania, Egypt, Libya, Mali, Western Sahara
- Asia – Myanmar, Oman, Bangladesh, India, Saudi Arabia, China, United Arab Emirates, Taiwan
- Water Bodies – Indian Ocean, Atlantic Ocean, Pacific Ocean, Taiwan Strait, Red Sea, Gulf of Mexico

There are 13 countries, 3 continents and 3 water bodies lies on **Equator** passes.

- South America – Equador, Columbia, Brazil
- Africa – Gabon, Congo, Democratic Republic of Congo, Uganda, Kenya, Sao Tome and Principe, Somalia
- Asia – Maldives, Indonesia and Kiribati(Oceania)
- Water Bodies – Atlantic, Pacific, Indian Ocean

There are 8 countries, 3 continents and 6 water bodies lies on **Prime Meridian** passes.

- Europe – United Kingdom, Spain, France
- Africa – Ghana, Algeria, Mali, Togo, Burkina Faso
- Antarctica – Antarctica
- Water Bodies – Arctic Ocean, Norwegian Sea, Greenland Sea, Mediterranean Sea, Atlantic Ocean, Southern Ocean

Q.12) Consider the following statements:

1. Instruments used to measure direction of the wind is anemometer

2. Instruments used to measure relative humidity is hygrometer
3. Instruments used to measure wind speed is wind vane

Choose correct codes from the options given below:

- a) 1 and 2 only
- b) 2 only
- c) 1 and 3 only
- d) 1, 2 and 3

Q.12) Solution (b)

Instruments used to measure direction of the wind is wind vane
Instruments used to measure relative humidity is hygrometer
Instruments used to measure wind speed is anemometer

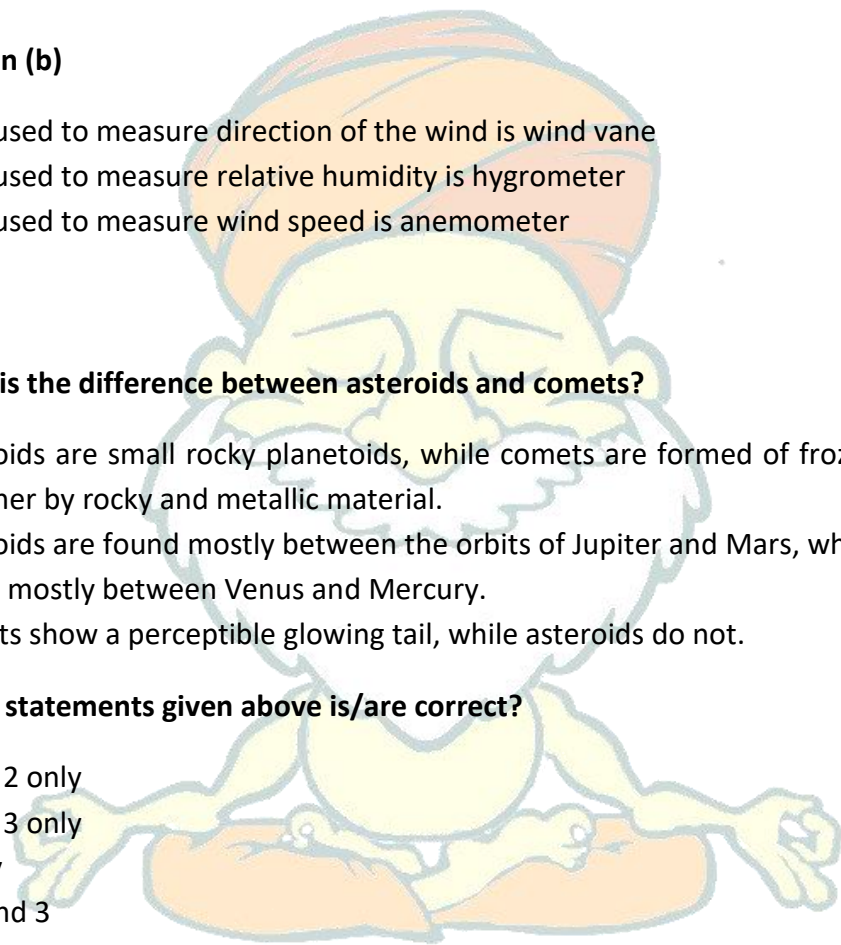
Q.13) Which is the difference between asteroids and comets?

1. Asteroids are small rocky planetoids, while comets are formed of frozen gases held together by rocky and metallic material.
2. Asteroids are found mostly between the orbits of Jupiter and Mars, while comets are found mostly between Venus and Mercury.
3. Comets show a perceptible glowing tail, while asteroids do not.

Which of the statements given above is/are correct?

- a) 1 and 2 only
- b) 1 and 3 only
- c) 3 only
- d) 1, 2 and 3

Q.13) Solution (b)

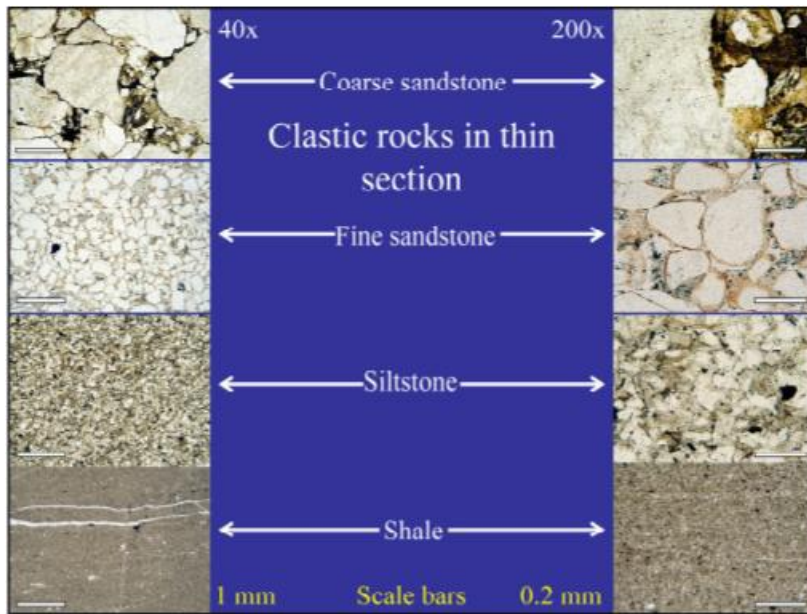


Comets	Asteroids
 Comet Hyakutake	 Asteroid: Artist's concept
Made up of ice and dust	Made up of rocks and metals
Form tails when they pass through the inner solar system	Do not form tails
Typically have orbits that are very much more elliptical and tilted than those of the planets	Typically have orbits that are much more elliptical and tilted than those of the planets
Usually orbit the Sun in two regions: the Kuiper Belt (about 30 to 50 AU from the Sun) and the Oort Cloud (extending outward to about 50,000 AU from the Sun)	Usually orbit the Sun in the asteroid belt, a region between Mars and Jupiter
Typically remain in the outermost regions of the solar system (beyond the orbit of Neptune), but can pass through the inner solar system if their orbits are elliptical enough	Typically remain in the asteroid belt, a region between Mars and Jupiter
May or may not orbit the Sun in the same direction as the planets	Orbit the Sun in the same direction as the planets

Q.14) Which is the correct sequence from the smallest to the largest grain of the following types of clastic rocks?

- Shale, sandstone, conglomerate, siltstone
- Shale, siltstone, sandstone, conglomerate
- Conglomerate, sandstone, shale, siltstone
- Sandstone, siltstone, conglomerate, shale

Q.14) Solution (b)



The **coarse sandstone** has sand grains typically 1-2 mm across. The grains touch one another and make up most of the rock. Smaller grains were deposited in the quiet waters in the spaces between the grains.

The **fine sandstone** has grains typically 0.2-0.5 mm across. Again, these grains touch one another and finer-grained material fills the space between the larger grains. Notice that many of the grains are rounded, indicative of long transport or exposures to a rough environment like a beach where the corners were worn off.

The **siltstone** has grains in the size range 0.01-0.1 mm. Though some are in the sand range, most are smaller and in the silt range. The grungy-looking material in between the clear quartz grains is partly clay that has formed from the in situ breakdown of feldspar grains.

The **shale** is made almost entirely out of clay, though a few grains of quartz occur up to 0.02 mm across. Even at 200x most of the clay grains are not resolvable. The horizontal white lines in the left shale photo are cracks that formed while the rock was being cut to make the thin section.

Q.15) Lapland is a cultural region largely within the Arctic Circle in the north of the Scandinavian Peninsula. Who inhabited the Lapland?

- a) Himba people
- b) Padaung people
- c) Hamar people

d) Sami people

Q.15) Solution (d)

The Sami people traditionally known in English as Lapps or Laplanders are an indigenous Finno-Ugric people inhabiting the Arctic area of Sápmi, which today encompasses parts of far northern Norway, Sweden, Finland, and the Kola Peninsula of Russia.

The Lapps call themselves "the Sami". And the whole area where the Lapps live, is called "Sapmi" (the land of the Sami).

The Sami are the only indigenous people of Scandinavia recognized and protected under the international conventions of indigenous peoples, and are hence the northernmost indigenous people of Europe.

Q.16) Consider the following pairs

Disputed territory

1. Kuril Islands
2. Guantanamo Bay
3. Chagos Archipelago

Territorial Entities

- Japan and China
USA and Mexico
Mauritius and the United Kingdom

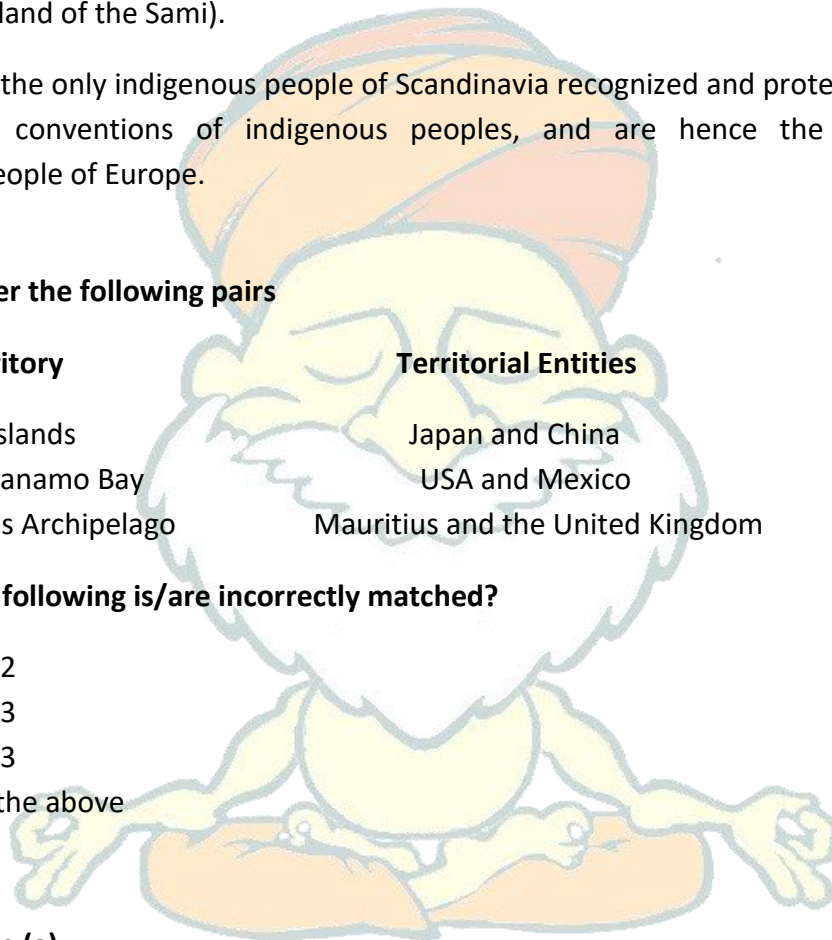
Which of the following is/are incorrectly matched?

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) All of the above

Q.16) Solution (a)

The Naval Base at Guantanamo Bay was leased to the U.S. originally in 1903, and only mutual agreement or U.S. abandonment of the facility can terminate the lease. In exchange for use of the land, the U.S. pays Cuba rent of \$4,085 a month. One rent check was cashed after the Cuban Revolution, but the Government of Cuba has declined to cash all subsequent checks, in protest of what it deems an illegal occupation.

The sovereignty dispute over the islands of Etorofu, Kunashiri, and Shikotan, and the Habomai group, known in Japan as the Northern Territories and in Russia as the Southern



Kuril Islands, occupied by the Soviet Union in 1945, now administered by Russia and claimed by Japan, remains the primary sticking point to signing a peace treaty formally ending World War II hostilities.

Sovereignty over the Chagos Archipelago is disputed between Mauritius and the United Kingdom. Mauritius has repeatedly asserted that the Chagos Archipelago is part of its territory and that the United Kingdom (UK) claim is a violation of United Nations' resolutions banning the dismemberment of colonial territories before independence. The UK has stated that it has no doubt about its sovereignty over the Chagos but has also said that the Chagos will be returned to Mauritius once the islands are no longer required for defence purposes. Given the absence of any progress with the UK, Mauritius has decided to internationalise the dispute and take up the matter at all appropriate legal and political forums. The African Union and the Non-Aligned Movement have expressed unanimous support for Mauritius on the Chagos issue.

Q.17) The Houthi rebels are from

- a) China
- b) Yemen
- c) Syria
- d) Ukraine

Q.17) Solution (b)

The Houthis are key players in an alliance of rebels formally known as Ansar Allah — or "Partisans of God" — who follow Shiite Islam.

Their name comes from Hussein Badr al-Din al-Houthi, who led an uprising in 2004 aimed at winning greater autonomy for provinces and protecting them from the perceived encroachment of Sunni Islam.

Houthi was killed in 2004 but his family and supporters led further rebellions and their influence has continued to expand following the 2012 ouster of strongman President Ali Abdullah Saleh.

Sunni-ruled Saudi Arabia and its allies, including the U.S., see the Shiite Houthis as being financially and militarily supported by Shiite-ruled Iran.

Iran denies this, although the U.S. Navy says it has intercepted several shipping boats since the war began carrying Iranian weaponry suspected to be on the way to Yemen.

Q.18) Consider the following statements about Organisation for Economic Co-operation and Development (OECD)

1. India is a founding member of the OECD
2. International Energy Agency (IEA) was established by OECD
3. India is one of the member jurisdictions of Financial Action Task Force (on Money Laundering) (FATF), which is established by OECD

Select the correct statements

- a) Only 2
- b) 2 and 3
- c) 1 and 3
- d) 1 and 2

Q.18) Solution (b)

India is not a member of OECD.

IEA is a Paris-based autonomous intergovernmental organization established in the framework of the Organisation for Economic Co-operation and Development (OECD) in 1974 in the wake of the 1973 oil crisis. The IEA was initially dedicated to responding to physical disruptions in the supply of oil, as well as serving as an information source on statistics about the international oil market and other energy sectors.

FATF is an intergovernmental organization founded in 1989 on the initiative of the G7 to develop policies to combat money laundering. In 2001 the purpose expanded to act on terrorism financing. It monitors countries' progress in implementing the FATF Recommendations by 'peer reviews' ('mutual evaluations') of member countries. The FATF Secretariat is housed at the headquarters of the OECD in Paris.

As of 2016 FATF consists of thirty-five member jurisdictions and two regional organisations, the EU and the Gulf Co-operation Council. The FATF also works in close co-operation with a number of international and regional bodies involved in combating money laundering and terrorism financing. India is one of the member jurisdictions

Q.19) Recently Health Ministry launched single vaccine for dual protection against which of the following diseases as part of Universal Immunization Programme (UIP)

- a) Measles
- b) Whooping Cough
- c) Tuberculosis
- d) Both (a) and (c)

Q.19) Solution (a)

Single vaccine for dual protection against measles and rubella as part of Universal Immunization Programme

Measles is a deadly disease and one of the important causes of death in children. It is highly contagious and spreads through coughing and sneezing of an infected person. Measles can make a child vulnerable to life threatening complications such as pneumonia, diarrhoea and brain infection. Globally, in 2015, measles killed an estimated 1, 34,200 children—mostly under-5 years. In India, it killed an estimated 49,200 children.

Rubella is generally a mild infection, but has serious consequences if infection occurs in pregnant women, causing congenital rubella syndrome (CRS), which is a cause of public health concern. CRS is characterized by congenital anomalies in the foetus and newborns affecting the eyes (glaucoma, cataract), ears (hearing loss), brain (microcephaly, mental retardation) and heart defects, causing a huge socio-economic burden on the families in particular and society in general.

Q.20) Consider the following statements

1. Chasma Boreale is a large canyon in Mars's north polar ice cap
2. NASA's THEMIS Mission purpose is to study the possibility of life on Mars

Select the correct statements

- a) Only 1
- b) Only 2
- c) Both 1 and 2
- d) Neither 1 nor 2

Q.20) Solution (a)

Chasma Boreale is a large canyon in Mars's north polar ice cap in the Mare Boreum quadrangle of Mars at 83° north latitude and 47.1° west longitude. It is about 560 km (350 mi) long and was named after a classical albedo feature name.

Chasma Boreale, a long, flat-floored valley, cuts deep into Mars' north polar icecap. Its walls rise about 4,600 feet, or 1,400 meters, above the floor. Where the edge of the ice cap has retreated, sheets of sand are emerging that accumulated during earlier ice-free climatic cycles. Winds blowing off the ice have pushed loose sand into dunes and driven them down-canyon in a westward direction.

The Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission was originally a constellation of five NASA satellites (THEMIS A through THEMIS E) to study energy releases from Earth's magnetosphere known as substorms, magnetic phenomena that intensify auroras near Earth's poles. The name of the mission is an acronym alluding to the Titan, Themis.

Three of the satellites remain in the magnetosphere, while two have been moved into orbit near the Moon. Those have been renamed ARTEMIS for Acceleration, Reconnection, Turbulence and Electrodynamics of the Moon's Interaction with the Sun. THEMIS B became ARTEMIS P1 and THEMIS C became ARTEMIS P2.

Source: <http://www.thehindu.com/news/international/Swirling-spirals-spotted-at-the-north-pole-of-Mars/article17201283.ece>

Q.21) The LINPACK Benchmarks is concerned with

- a) Trade Facilitation Agreement in Services
- b) Missile's payload delivery
- c) Light Detection and Ranging
- d) Supercomputers

Q.21) Solution (d)

LINPACK benchmarks

The LINPACK Benchmarks are a measure of a system's floating point computing power.

Introduced by Jack Dongarra, they measure how fast a computer solves a dense n by n system of linear equations $Ax = b$, which is a common task in engineering.

Source: <http://www.thehindu.com/news/national/india-building-a-supercomputer-juggernaut/article17363153.ece?homepage=true>

Q.22) 'Sathiya Resource kit' has been launched by the Union Government recently. The aim of this kit is to:

- a) Provide information on pregnancy related issues
- b) Provide information on adolescent related issues
- c) Provide information on self-defence for girls.
- d) Provide information about nearest police stations

Q.22) Solution (b)

The Union Ministry of Health and Family Welfare has launched SAATHIYA Resource Kit and SAATHIYA SALAH mobile app for adolescents as part of the Rashtriya Kishor Swasthya Karyakram (RKSK) programme. The kit and app will help Peer Educators (Saathiyas) who are introduced under the RKSK programme. The Saathiyas act as catalyst for generating demand for adolescent health services and also impart age appropriate knowledge on key adolescent health issues to their peer groups.

Key Facts

The Resource Kit has been developed by United Nations Population Fund (UNFPA) and Population Foundation of India (PFI).

The kit comprises i) Activity Book, ii) Bhranti-Kranti Game iii) Question-Answer Book and iv) Peer Educator Diary.

It has been designed to present the Peer Educators with key information on adolescent health, which would then enable them to communicate the same and help the adolescents at the grass root/village level'.

In addition, the mobile app 'Saathiya Salah' acts as cost-effective information platform for the adolescents. It also has feature of toll-free Saathiya Helpline which will act as an e-counselor

Q.23) Which of the following is/are correctly matched?

Archipelago

Country

- | | |
|-------------------|----------|
| 1. Svalbard | Sweden |
| 2. Faroe Islands | Norway |
| 3. Azores | Portugal |
| 4. Canary Islands | Spain |

Select the correct code:

- a) 1, 3 and 4
- b) 3 and 4
- c) 2, 3 and 4
- d) 1, 2 and 3

Q.23) Solution (b)

Svalbard - Norway

Faroe Islands - Denmark

Azores - Portugal

Canary Islands – Spain

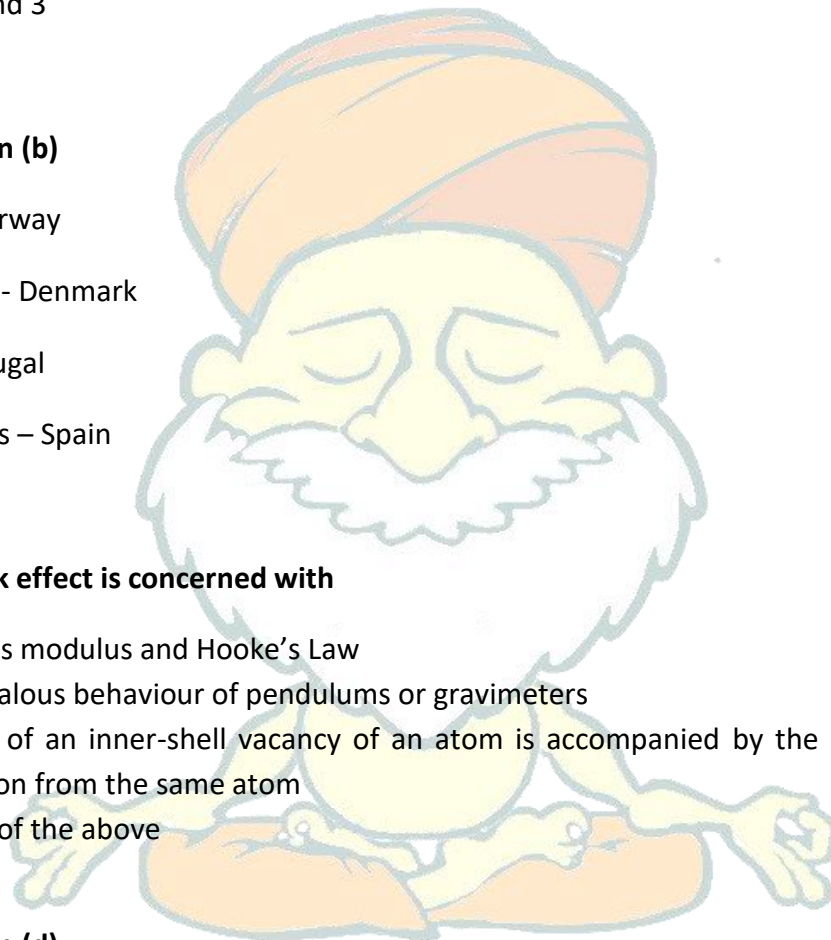
Q.24) McGurk effect is concerned with

- a) Youngs modulus and Hooke's Law
- b) Anomalous behaviour of pendulums or gravimeters
- c) Filling of an inner-shell vacancy of an atom is accompanied by the emission of an electron from the same atom
- d) None of the above

Q.24) Solution (d)

It is a powerful multisensory illusion occurring with audiovisual speech whereby the brain can be deceived into hearing sounds that don't exist. The effect is named after researcher Harry McGurk, who published a 1976 paper with John MacDonald titled "Hearing lips and seeing voices".

It involves showing a person's lips making the shape of one sound — like "bah" — while the audio is actually the person saying "fah." What's interesting is that your brain changes what you "hear" based on what you see. It's "bah" all the way through, but when we see "bah"



our minds transform “bah” into “fah”. It has been replicated many times and has sparked an abundance of research. It demonstrates the overwhelming influence that sight exerts over the brain and how the latter reorders perception to give us a consistent picture of the world.

Source: <http://www.thehindu.com/todays-paper/tp-opinion/demystifying-science-february-26-2017/article17370018.ece>

Q.25) Arun – III hydroelectric project is being developed as

- a) Storage hydroelectric
- b) Pumped-storage hydroelectric
- c) Offshore hydroelectric
- d) Run-of-river hydroelectric

Q.25) Solution (d)

The project is located in the Sankhuwasabha district of Nepal, 657 km from Kathmandu via Birat Nagar.

It is being developed as run-of-the-river hydroelectricity (ROR hydroelectricity)

Run-of-the-river hydroelectricity is a type of hydroelectric generation whereby the natural flow and elevation drop of a river are used to generate electricity.

Source: <http://pib.nic.in/newsite/PrintRelease.aspx?relid=158630>

