



SCIENCE APTITUDE TEST

CLASS 8

ANSWER KEY WITH SOLUTIONS

DATE : 05.01.25

IIT Ashram
IIT JEE | NEET | GUJCET | FOUNDATION (6 to10)



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PART - I : MENTAL ABILITY

1.

Sol. (a) 162

The sequence multiplies each number by 3:

$$2 \times 3 = 6, 6 \times 3 = 18, 18 \times 3 = 54, 54 \times 3 = 162$$

2.

Sol. (d) H

The pattern skips 3, 4, 5, 6 letters respectively between each letter. After Z, skipping 7 letters leads to H.

3.

Sol. (c) Maternal Grandmother

P is Q's mother, Q is R's wife, and S is R's son. Therefore, P is Q's mother and Q is S's mother, making P the maternal grandmother of S.

4.

Sol. (b) Sunday

85 days = 12 weeks + 1 day. Yesterday was Friday. So, today is Saturday. 12 weeks later would still be Saturday. So, 85 days from today has the same day of the week as one from today, Sunday.

5.

Sol. (c) $50 + 10 - 2$

Replacing with new meanings:

$$50 - 10 \times 2 = 50 - 20 = 30$$

6.

Sol. (a) 4, 3, 5, 2, 1

This represents the natural progression of human growth: infant, toddler, child, teenager, adult.

7.

Sol. (c) 22

Following order of operations:

$$24 \div 4 + 3 \times 7 - 5 = 6 + 3 \times 7 - 5 = 6 + 21 - 5 = 27 - 5 = 22$$

8.

Sol. (a) 15

Using set theory:

$$\text{Total} - (\text{Cricket} + \text{Football} - \text{Both}) = 60 - (35 + 25 - 15) = 60 - 45 = 15$$

9.

Sol. (d) 58

$$P(11) + O(12) + W(4) + E(22) + R(9) = 58$$

10.

Sol. (b) 258

All other numbers are powers of 2 ($2^2, 2^3, 2^7, \dots, 2^9, 2^{11}$). 256 (not 258) is 2^8

11.

Sol. (c) TGF

Each letter is shifted forward by 2 positions in the alphabet.

TGF \rightarrow RED (The question asked is not how RED is coded but what RED is the code for)

12.

Sol. (a) 100°

Using the formula $|30H - 5.5M|$, where H is the hour and M is the minutes:

$$|30(4) - 5.5(40)| = |120 - 220| = 100^\circ$$

13.

Sol. (b) Bob

With Bob in the middle, the rest cannot be seated following the given constraints.

14.

Sol. (d)

The answer is 1944 as the numbers are arranged in the following way,
 $2 \times 3 = 6, 3 \times 6 = 18, 6 \times 18 = 108, 18 \times 108 = 1944$

15.

Sol. (c) O

Original word: CONSTITUTIONAL

Alphabetical Arrangement: ACIILNNOOSTTTU

The 8th letter in the Alphabetical arrangement is O.

PART - I : MATHEMATICS

1.

Sol. (a) Percentage of oranges she ate = $\frac{3}{12} \times 100 = 25\%$

2.

Sol. (b) 3.16

3.

Sol. (d)

$$d_1 = 10 \text{ cm, } d_2 = 24 \text{ cm}$$

$$\text{Side of rhombus} = \frac{1}{2} \sqrt{d_1^2 + d_2^2} = \frac{1}{2} \sqrt{100 + 576}$$

$$= \frac{1}{2} \sqrt{676} = \frac{1}{2} \times 26 = 13 \text{ cm}$$

$$\therefore \text{Perimeter of rhombus} = 4 \times \text{side} = 4 \times 13 = 52 \text{ cm}$$

4.

Sol. (c)

Let $x = 12345678$
and $y = 14236789$
then,

$$\frac{(12345678 + 14236789)^2 - (12345678 - 14236789)^2}{12345678 \times 14236789} = \frac{(x+y)^2 - (x-y)^2}{x \times y}$$

$$= \frac{x^2 + 2xy + y^2 - x^2 + 2xy - y^2}{x \times y} = \frac{4xy}{xy} = 4$$

5.

Sol. (c) $\sqrt{1.728a^3b^9} = 1.2 ab^3$

6.

Sol: (a)

$$3^{2x-1} = 81$$

$$\Rightarrow 3^{2x-1} = 3^4 \quad \Rightarrow 2x - 1 = 4 \quad \Rightarrow x = \frac{5}{2} = 2.5$$

7.

Sol. (d)

The student requires 50% marks to pass.

maximum marks = 200

\therefore Passing marks = 100

Ranbir scored 87 marks.

\therefore Marks need to pass = $100 - 87 = 13$

8.

Sol: (d)

$$\sqrt{4082 + \sqrt{188 + \sqrt{64}}}$$

$$\Rightarrow \sqrt{4082 + \sqrt{188 + \sqrt{8}}} \quad \Rightarrow \sqrt{4082 + \sqrt{196}} \quad \Rightarrow \sqrt{4082 + 14} \quad \Rightarrow \sqrt{4096} = 64$$

9.

Sol. (d)

Let the angle are $2x$ and $7x$ then, $2x + 7x = 180^\circ$

$$9x = 180^\circ$$

$$x = 20^\circ$$

$$\therefore 2x = 2 \times 20^\circ = 40^\circ$$

$$7x = 7 \times 20^\circ = 140^\circ$$

 \therefore Smaller of the two angle is of measure 40° .

10.

Sol. (d)

$$(5)^{a^a} = 625 \quad \Rightarrow (5)^{a^a} = 5^4$$

$$\therefore a^a = 4 \quad \Rightarrow a^a = 2^2$$

$$\therefore a = 2$$

11.

Sol. (b)

$$x = \sqrt{123.21}$$

$$x = 11.1 \text{ (by long division)}$$

12.

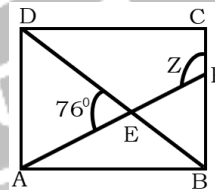
Sol: (a)

$$\angle AED = \angle BEF = 76^\circ \text{ (vertically opposite angles)}$$

$$\angle EBF = 45^\circ \text{ (}\because \angle DBA = \angle DBC = 45^\circ \text{)}$$

$$\therefore \angle EFC = \angle BEF + \angle EBF$$

$$\therefore z = 76^\circ + 45^\circ = 121^\circ.$$



13.

Sol. (b)

$$(5x^2y + y^2z) + (3x^2y - 2y^2z) = 8x^2y - y^2z$$

14.

Sol. (a)

Let Baldev's salary = Rs 100

Kisan's salary = Rs 90

Difference between their salary = Rs 10

$$\text{Required percentage} = \frac{\text{Difference}}{\text{Kisan's salary}} \times 10 = \frac{10}{90} \times 100 = 11\frac{1}{9}\%$$

15.

Sol. (b)

Prime factorisation of 6144

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$$

$$= 8 \times 8 \times 8 \times 12 = (8)^3 \times 12$$

\therefore 12 is the smallest number which divides 6144 to obtain a perfect cube quotient.

\therefore Sum of digits = $1 + 2 = 3$

16.

Sol. (a)

let A's pocket money = Rs 100

 \therefore B's pocket money

$$= \text{Rs } 100 + 30\% \text{ of Rs } 100 = \text{Rs } 130$$

and C's pocket money = Rs 130 + 30% of Rs 130 = 169

 \therefore Difference of pocket money of C and A

$$= \text{Rs } 169 - \text{Rs } 100 = \text{Rs } 69$$

\therefore C's pocket money is 69% more than A's pocket money.

17.

Sol. (c) Negative

18.

Sol. (d)

let 'x' be the number when added to $\frac{-5}{11}$ be comes the additive inverse of $\left(\frac{1}{7} + \frac{4}{15}\right)^{-1}$.

$$\frac{-5}{11} + x = -\left(\frac{1}{7} + \frac{4}{15}\right)^{-1} \Rightarrow \frac{-5}{11} + x = -\left(\frac{15 + 28}{105}\right)^{-1} \Rightarrow \frac{-5}{11} + x = -\left(\frac{105}{43}\right)$$

$$x = -\frac{105}{43} + \frac{5}{11} \Rightarrow x = \frac{-1155 + 215}{473} = \frac{-940}{473}$$

19.

Sol. (b)

$$\sqrt{1234321} = 1111$$

$\therefore 51^2 - 1111 = 2601 - 1111 = 1490 \Rightarrow$ It is evident that $38^2 < 1490$

\therefore Next perfect square = $39^2 = 1521 \therefore$ Required number to be added

$$= 1521 - 1490 = 31$$

20.

Sol: (d) $\frac{5}{3}$

21.

Sol: (a)

$$(121)^2 = 14641$$

\therefore Sum of digits = $1 + 4 + 6 + 4 + 1 = 16$

\therefore Square root = 4

22.

Sol: (c)

$$\frac{285}{475} \times 100 = 60\%$$

23.

Sol. (a)

When a dice is thrown, the numbers that can appear on its face are 1, 2, 3, 4, 5, 6. We need to find the probability of the square of the number being a multiple of 9.

$$1^2 = 1$$

$$2^2 = 4$$

$$3^2 = 9 \text{ (Multiple of 9)}$$

$$4^2 = 16$$

$$5^2 = 25$$

$$6^2 = 36 \text{ (Multiple of 9)}$$

So, there are 2 favourable out comes 3 and 6.

$$\therefore \text{Probability} = \frac{2}{6} = \frac{1}{3}$$

24.

Sol. (d)

$$\angle ADE = 50^\circ$$

$$\angle ADE = \angle ABC \text{ (Opposite angles of 11 gm)}$$

$$\angle ABC = 50^\circ$$

$$\Rightarrow AB \parallel DC \Rightarrow AB \parallel CE$$

$$\therefore \angle BAC + \angle ACE = 180^\circ \text{ (Co-interior)}$$

$$\angle BAC + 90^\circ = 180^\circ$$

$$\angle BAC = 90^\circ$$

In quadrilateral ACEB, three angles

$$\angle ACE = \angle BEC = \angle BAC = 90^\circ$$

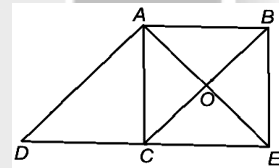
$$\Rightarrow \text{Fourth angle } \angle ABE = 90^\circ$$

$$\therefore \text{ACEB is reactangle}$$

$$\therefore \angle OBA = \angle OAB = 50^\circ (\because \angle ABC = 50^\circ)$$

$$\therefore \angle OAC = 90^\circ - \angle OAB = 90^\circ - 50^\circ = 40^\circ$$

$$\therefore \angle EAC = 40^\circ (\because \angle OAC = \angle EAC)$$



25.

Sol: (b)

$$\frac{5.6(x+3)}{0.7} = 24$$

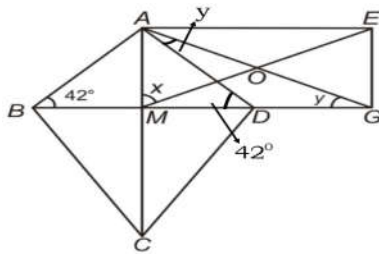
$$5.6x + 16.8 = 16.8$$

$$\therefore x = 0$$

$$\therefore 2x + 1 = 2(0) + 1 = 1$$

26.

Sol: (c)



In $\triangle ABD$,

$$AB = AD$$

$$\Rightarrow \angle ABD = \angle ADB = 42^\circ$$

In $\triangle ADG$,

$$\Rightarrow \angle DAG = \angle DGA = y$$

Ext $\angle ADB = \angle DAG + \angle DGA$

$$\therefore 42^\circ = y + y$$

$$\therefore y = 21^\circ$$

In $\triangle AMD$,

$$\angle MAD = 90^\circ - \angle ADM = 90^\circ - 42^\circ = 48^\circ$$

$$\therefore \angle OAM = 48^\circ + 21^\circ = 69^\circ$$

$$\therefore \angle OAM = \angle OMA$$

$$\therefore 69^\circ = x$$

$$\text{Now } x - y = 69^\circ - 21^\circ = 48^\circ$$

27.

Sol: (b)

$$d_1 = x$$

$$d_2 = y$$

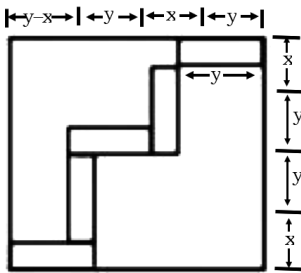
$$P = 4 \times \text{side} \Rightarrow \text{side} = \frac{P}{4}$$

$$\therefore \text{Side of rhombus} = \frac{1}{2} \sqrt{d_1^2 + d_2^2}$$

$$\Rightarrow \frac{P}{4} = \frac{1}{2} \sqrt{x^2 + y^2} \Rightarrow 2P = 4\sqrt{x^2 + y^2} \Rightarrow P = 2\sqrt{x^2 + y^2} \Rightarrow P^2 = 4(x^2 + y^2)$$

28.

Sol: (d)



let x and y are the adjant sides of ach rectangle.

$$\therefore y - x + y + x + y = 24$$

$$3y = 24$$

$$y = 8 \text{ cm}$$

$$x + y + y + x = 24$$

$$x + y = 12$$

$$x + 8 = 12$$

$$x = 4 \text{ cm}$$

$$\therefore \text{Area of rectangle} = x \times y = 4 \times 8 = 32\text{cm}^2$$

29.

Sol: (c)

$$p = x + \frac{1}{x} \Rightarrow p = \frac{x^2 + 1}{x} \quad \therefore \frac{1}{p} = \frac{x}{x^2 + 1}$$

$$\text{Now, } p - \frac{1}{p} = \frac{x^2 + 1}{x} - \frac{x}{x - 1}$$

$$= \frac{(x^2 + 1)^2 - x^2}{x(x^2 + 1)} = \frac{x^4 + 2x^2 + 1 - x^2}{x^3 + x} = \frac{x^4 + x^2 + 1}{x^3 + x}$$

30.

Sol: (d)

$$a - 5 = 0, b - c = 0, c - d = 0, b + c + d - 9 = 0$$

$$\therefore a = 5, b = c, c = d, b + c + d = 9$$

$$b = c \text{ and, } c = d$$

$$\Rightarrow b = c = d$$

$$\therefore b + c + d = 9$$

$$\therefore b = c = d = \frac{9}{3} = 3$$

$$\text{Now, } (a + b + c) \times (b + c + d)$$

$$= (5 + 3 + 3) \times (3 + 3 + 3) = (11) \times (9) = 99$$

31.

Sol: (a)

$$5x + 3x = 640$$

$$8x = 640$$

$$x = 80$$

$$\therefore \text{Number of boys} = 5x = 5 \times 80 = 400$$

$$\therefore \text{Number of girls} = 3x = 3 \times 80 = 240$$

$$\text{After admitting 30 more girls number of girls} = 240 + 30 = 270$$

If the number of boys to be admitted be y

$$\therefore \text{Number to boys} = 400 + y$$

$$\text{Now, } \frac{400 + y}{270} = \frac{14}{9}$$

$$3600 + 9y = 3780$$

$$9y = 180$$

$$\therefore y = 20$$

$$\therefore \text{Number of boys to be admitted is 20.}$$

32.

Sol: (a)

Present population

$$= 4000 \times \left(1 + \frac{2}{100}\right) \times \left(1 + \frac{4}{100}\right) = 4000 \times \frac{102}{100} \times \frac{104}{100} = 4243.2 \approx 4243$$

33.

Sol: (c)

$$10,000 \left(1 + \frac{R}{100}\right)^2 = 11664$$

$$\Rightarrow \left(1 + \frac{R}{100}\right)^2 = \left(\frac{11664}{10,000}\right) \Rightarrow 1 + \frac{R}{100} = \frac{108}{100} \Rightarrow \frac{R}{100} = \frac{108}{100} - 1$$

$$R = 8$$

34.

Sol: (c)

Let x be the total length

$$\therefore x - \left(\frac{x}{2} + \frac{x}{3}\right) = 7\text{m}$$

$$\therefore x = 42\text{m}$$

35.

Sol: (d)

$$\text{Number of revolutions} = \frac{\text{total distance}}{\text{Circumference}} = \frac{11 \times 1000}{2 \times \frac{22}{7} \times 0.25} = 7000$$

36.

$$\text{Sol: (b)} \quad x^y = y^x \Rightarrow x = (y^x)^{\frac{1}{y}} \quad \therefore \quad x = y^{\frac{x}{y}}$$

$$\text{Now, } \left(\frac{x}{y}\right)^{\frac{x}{y}} = \frac{x^{\frac{x}{y}}}{y^{\frac{x}{y}}} = \frac{x^{\frac{x}{y}}}{x} \left(\because x = y^{\frac{x}{y}}\right) = \left(x^{\frac{x-1}{y}}\right)$$

37.

Sol: (c)

$$(a)^a = b$$

$$(c^c)a = b \quad (\because a = c^c)$$

$$\Rightarrow (c)^{ac} = b$$

$$\Rightarrow (b^b)^{ac} = b \quad (\because c = b^b)$$

$$\Rightarrow b^{abc} = b$$

$$\therefore abc = 1$$

38.

Sol: (d)

$$\text{Nearest perfect square} = 900$$

$$\therefore \text{least number to be subtracted} = 45$$

39.

Sol: (b)

$$\sqrt[3]{5 \frac{23}{64}} = \sqrt[3]{\frac{343}{64}} = \frac{7}{4} = 1.75$$

40.

Sol: (b)

$$\sqrt{14.44} + \sqrt{9+x^2} = 8.8$$

$$3.8 + \sqrt{9+x^2} = 8.8$$

$$\sqrt{9+x^2} = 5$$

$$9 + x^2 = 25$$

$$x^2 = 16$$

$$x = 4$$

PART - III : PHYSICS & CHEMISTRY

1.

Sol. (c) 247.5 m

(Explanation: Distance $d = \frac{\text{speed} \times \text{time}}{2} = \frac{330 \times 1.5}{2} = 247.5\text{m}$)

2.

Sol. (a) 20 Hz to 20kHz

3.

Sol. (b)

Sound reflects from a wall 15 m away.

(Explanation: For an echo to be heard, the reflecting surface must be at least 17 m away, as the minimum time for the human ear to distinguish two sounds is 0.1 s.)

4.

Sol. (a) 0.77 mm

(Explanation: Wavelength

$$\lambda = \frac{\text{velocity}}{\text{frequency}} = \frac{1540}{2 \times 10^6} = 0.00077$$

m = 0.77 mm)

5.

Sol. (a) 50 Pa

(Explanation: Pressure

$$P = \frac{\text{Force}}{\text{Area}} = \frac{10}{0.2} = 50 \text{ Pa}$$

6.

Sol. (a) 60°

$$i = 90^\circ - \text{glancing angle} = 90^\circ - 30^\circ = 60^\circ$$

$$\text{angle of deviation} = 180^\circ - 2i = 180^\circ - 2(60^\circ) = 60^\circ$$

7.

Sol. (c) 11

The number of images formed by two mirrors placed at an angle can be calculated using the formula:

$$n = \frac{360^\circ}{\theta} - 1$$

Where:

θ is the angle between the two mirrors.

Given:

$$\theta = 30^\circ$$

Substitute into the formula:

$$n = \frac{360^\circ}{30^\circ} - 1 = 12 - 1 = 11$$

8.

Sol. (c)

According to Newton's First Law of Motion (the law of inertia), an object in motion will remain in motion with a constant velocity unless acted upon by an unbalanced external force.

Since no unbalanced force is acting on the body, it will continue moving with the same velocity.

9.

Sol. (b)

The chemical effect of electric current can split water into hydrogen and oxygen gases through a process called electrolysis.

10.

Sol. (c)

Frictional force is a contact force because it acts when two surfaces are in direct contact with each other. The other forces listed, like gravitational, electrostatic, and magnetic forces, can act at a distance and are non-contact forces.

11.

Sol. (a)

On a smooth road, there is less friction compared to the other surfaces, so the car will travel the farthest before it stops. Higher friction on the gravel, muddy, and sand roads will cause the car to stop more quickly.

12.

Sol. (b)

In a conductor, the electrons are the charge carriers. They move through the material when an electric field is applied, allowing electric current to flow.

13.

Sol. (b)

The best protection during a thunderstorm is to avoid open spaces and seek shelter in a metal building, as metal conducts electricity and directs the lightning safely into the ground. Trees and bridges are dangerous because they can attract lightning.

14.

Sol. (d)

Hypermetropia, or farsightedness, is a condition where a person can see distant objects clearly, but nearby objects appear blurry. This occurs because the light entering the eye is focused behind the retina.

15.

Sol. (c)

In a prism, the refractive index is higher for violet light compared to other colors. Since violet light bends the most, it is seen at the bottom of the screen. The red light, with the lowest refractive index, bends the least and appears at the top of the screen.

16.

Sol. (c) Banana peel

Banana peel is a natural material that decomposes easily, making it biodegradable.

17.

Sol. (b) Steel

Steel is an alloy made of iron and carbon.

18.

Sol. (c) Carbon tetrachloride

Carbon tetrachloride (CCl_4) was used as a fire extinguisher to put out petrol fires because it forms a layer of dense vapors that smothers the flames and prevents oxygen from reaching them

19.

Sol. (b)

A is correct, but R is not the correct explanation of A.

Gold and silver are used in jewelry because they are non-reactive and malleable.

20.

Sol. (a) Galvanization

Galvanization is the process of coating iron with zinc to prevent rusting.

21.

Sol. (c) Graphite

Graphite is a non-metal that conducts electricity due to free electrons.

22.

Sol. (b) Teflon

Teflon is used in non-stick cookware due to its heat resistance and non-stick properties.

23.

Sol. (b) Quicklime

Quicklime (calcium oxide) neutralizes acidic soils.

24.

Sol. (d) Hydrogen

Hydrogen has the highest calorific value among the given fuels.

25.

Sol: (c) Potassium

Potassium is the most reactive metal among the given options.

26.

Sol. (b) Hydrogen

When metals react with acids, hydrogen gas is released.

27.

Sol: (b)

Since coal was formed from the remains of vegetation, coal is called a fossil fuel and it is used in thermal power plants for generation of electricity.

Coke is a tough, porous and black substance. It is an almost pure form of carbon.

Coal tar is a black, thick liquid with an unpleasant smell. It is a mixture of about 200 substances.

28.

Sol. (d)

Coke is an almost pure form of carbon. Coke is used in the manufacture of steel and in the extraction of many metals. Naphthalene balls which are used to repel moth and other insects are obtained from coal tar.

Earlier, coal gas was used for street lighting. Now a day, it a fuel in many industries situated near the coal processing plants. LPG (liquefied petroleum gas) used as fuel for home and industry.

29.

Sol. (d)

Sodium bicarbonate - Used in medicines and fire extinguishers

Potash alum - Used in purification of water

Potassium nitrate - Used in fireworks

Copper sulphate - Used as a fungicide.

30.

Sol. (a)

A change in colour of the solution indicates the chemical effect of current.

PART - IV : BIOLOGY

1.

Sol: (b) adolescence

Adolescence is the stage of life when an individual undergoes physical, emotional, and reproductive changes, marking the transition from childhood to adulthood.

2.

Sol: (a) Puberty

Puberty is the phase during adolescence when the body undergoes significant physical and hormonal changes, including the development of reproductive organs.

3.

Sol: (d) sperm

The male germ cell, which plays a crucial role in fertilization, is the sperm.

4.

Sol: (a) 1

Typically, only one egg is released from the ovary during each menstrual cycle, a process known as ovulation.

5.

Sol: (d) Biodiversity

Biodiversity refers to the variety of life on Earth, including the different species, ecosystems, and genetic variations.

6.

Sol: (c) Atmospheric Nitrogen fixer

Rhizobium bacteria are capable of fixing nitrogen from the atmosphere into a form that plants can use. This occurs in the root nodules of leguminous plants.

7.

Sol: (a) Fermentation

Fermentation is a metabolic process where sugars are converted into alcohol and carbon dioxide by the action of yeast.

8.

Sol: (c) Plough, Hoe, Cultivator

These tools are used for preparing the soil by loosening, tilling, and breaking it down into smaller pieces before sowing seeds.

9.

Sol: (b) Crop Rotation

Crop rotation involves growing different crops in a sequence on the same field to improve soil fertility and reduce pest and disease build-up.

10.

Sol: (d) Traditional methods of irrigation

These are traditional irrigation methods used to lift water from wells or ponds for agricultural use.

11.

Sol: (c) plants

Plants are autotrophs, meaning they can produce their own food through the process of photosynthesis.

12.

Sol: (a) Nitrogen

Leguminous plants have nitrogen-fixing bacteria in their roots, which help replenish the nitrogen in the soil, an essential nutrient for plant growth.

13.

Sol: (a) Produce young ones

Viviparous organisms give birth to live young ones, as opposed to laying eggs. Examples include humans, mammals, etc.

14.

Sol: (a) Ovary

Eggs are produced in the ovaries of females. This process is known as oogenesis.

15

Sol: (a) Adolescence period

Adolescence is the period in which an individual's reproductive organs mature, and the person becomes capable of reproduction.