RRB Junior Engineer - 1st Stage Grand Test – RRB-JE-T1 – 190312

HINTS & SOLUTIONS

ANSWER KEY

1.(1)	21.(1)	41.(4)	61.(3)	81.(4)
2.(2)	22.(1)	42.(3)	62.(1)	82.(2)
3.(4)	23.(3)	43.(3)	63.(3)	83.(3)
4.(2)	24.(4)	44.(2)	64.(3)	84.(1)
5.(3)	25.(4)	45.(2)	65.(2)	85.(1)
6.(1)	26.(3)	46.(4)	66.(4)	86.(3)
7.(4)	27.(3)	47.(4)	67.(3)	87.(2)
8.(1)	28.(4)	48.(1)	68.(2)	88.(3)
9.(1)	29.(1)	49.(2)	69.(4)	89.(2)
10. (3)	30.(1)	50.(3)	70.(3)	90.(4)
11.(3)	31.(3)	51.(1)	71.(1)	91.(1)
12.(4)	32.(2)	52.(2)	72.(3)	92.(4)
13.(4)	33.(1)	53.(4)	73.(4)	93.(2)
14.(2)	34.(4)	54.(2)	74.(1)	94.(3)
15.(3)	35.(1)	55.(1)	75.(3)	95.(2)
16.(2)	36.(2)	56.(4)	76.(2)	96.(1)
17.(3)	37.(1)	57.(2)	77.(3)	97.(2)
18. (2)	38.(1)	58.(3)	78.(2)	98.(1)
19.(3)	39.(2)	59.(4)	79.(4)	99. (3)
20.(4)	40.(3)	60.(1)	80.(4)	100. (3)

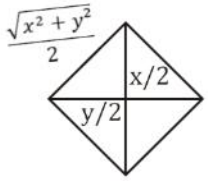
HINTS & SOLUTIONS

1.(1) From opt. $= \frac{2000+7}{200} = \frac{2007}{200} = 10.035$
Which is satisfying the condition.

2.(2) Price after 1st discount $= \frac{65\times90}{100} = Rs\ 58.5$
So,
The 2nd discount $= \frac{58.5-56.16}{58.5} \times 100$
$= 4\%$

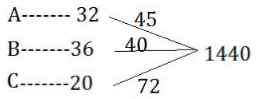
3.(4) $2x+4 < 2x+6$
$4 < 6$
It is independent to value of x. so for every value of x, it is truth.

4.(2)



$\frac{1}{2} \times \frac{\sqrt{x^2+y^2}}{2} \times height = \frac{1}{2}xy$
Height $= \frac{2xy}{\sqrt{x^2+y^2}}$

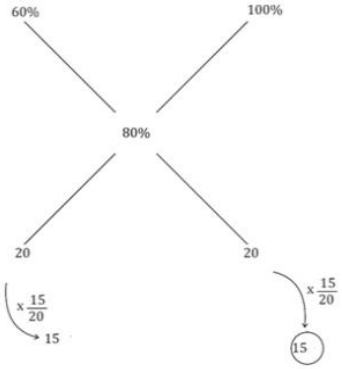
5.(3)



A + B - C = 85 – 72 = 13
∴ half of the tank will be filled in $\frac{720}{13}$ hrs
$= 55\frac{5}{13}$ hrs

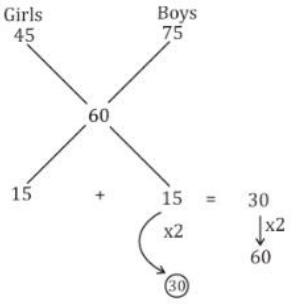
6.(1) $x^4 - 17x^3 + 17x^2 - 17x + 17$
$= x^4 - 16x^3 + 16x^2 - 16x - x^3 + x^2 - x + 17$
When x = 16
Expression
$= 16^4 - 16^4 + 16^3 - 16^2 - 16^3 + 16^2 - 16 + 17 = 1$

7.(4)



8.(1) Total surface area $= 4\pi r^2$
$= 4 \times \frac{22}{7} \times 7 \times 7$
$= 616\ cm^2$

9.(1)



10. (3) Original salary $= 15000 \times \frac{100}{120}$
$=$ Rs 12500

11.(3) Tank filled in $= \frac{1}{9} + \frac{1}{18} - \frac{1}{15}$
$= \frac{10+5-6}{90} = \frac{9}{10} = \frac{1}{10} = 10$ hrs

12.(4) $\frac{5}{6} \times x = 750$
$x = \frac{750}{5} \times 6 = 900$
∴ 45% of 900 = 45 × 9 = 405

13.(4) Side of square $= \sqrt{484} = 22$ cm
∴ length of wire = 22 × 4 = 88 cm
∴ $2\pi r = 88$
$\Rightarrow r = \frac{88}{2\times22} \times 7 = 14$ cm
∴ Area $= \pi r^2$
$= \frac{22}{7} \times 14 \times 14 = 616\ cm^2$

14.(2)
$$H = \frac{2PQ}{p+Q}$$
$$\frac{H}{P}+\frac{H}{Q} = \frac{2PQ}{(P+Q)P}+\frac{2PQ}{(P+Q)Q}$$
$$= \frac{2P}{P+Q}+\frac{2Q}{P+Q} = 2$$

15.(3)

	Now		usual
Speed	9	:	10
time	10	:	9

x29 → 261; 1 → x29 → 29

16.(2)
$$Sin^4 - Cos^4\theta = 1$$
$$(Sin^2\theta + Cos^2\theta)(Sin^2\theta - Cos^2\theta) = 1$$
$$(cos^2\theta - Sin^2\theta) = -1$$
$$Cos2\theta = -1$$

17.(3)
$$\frac{x}{1} = \frac{a-b}{a+b}$$
$$\frac{x+1}{x-1} = \frac{a-b+a+b}{a-b-a-b} = \frac{-2a}{2b} = \frac{-a}{b}$$
Similarly,
$$\frac{y+1}{y-1} = \frac{-b}{c} \text{ and } \frac{z+1}{z-1} = \frac{-c}{a}$$
$$\therefore \frac{x+1}{x-1}\times\frac{y+1}{y-1}\times\frac{z+1}{z-1} = \frac{-a}{b}\times\frac{-b}{c}\times\frac{-c}{a}$$
$$= -1$$

18. (2)

P		A				
1	:	3	:	9	:	27

5 year, 5 year, 5 year

19.(3) Divisible by 24 means it should be divisible by 8 and 3.
Divisibility rule of 8 – last 3 digit should be divisible by 8
Only (3) option matches that condition.

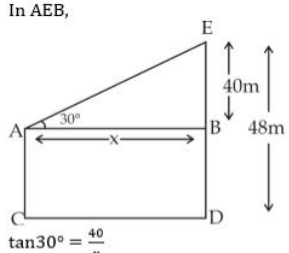
20.(4)

	A		B		C
	1	:	3	:	4
	100	:	300	:	400
+10%, +15%, +20%					
	110	:	345	:	480
	22	:	69	:	96

21.(1)
$$x + y = 2z$$
$$x = 2z - y$$
$$\Rightarrow x - z = 2z - y - z = z - y$$
$$\therefore \frac{x}{x-z}+\frac{z}{y-z} = \frac{x}{x-z}-\frac{z}{z-y}$$
$$= \frac{x}{x-z}-\frac{z}{x-z} = \frac{x-z}{x-z} = 1$$

22.(1)
$$tan\alpha = \sqrt{5}+2$$
$$cot\alpha = \frac{1}{\sqrt{5}+2} = \sqrt{5}-2$$
Now,
$$\tan\alpha - \cot\alpha = \sqrt{5}+2-\sqrt{5}+2 = 4$$

23.(3) In AEB,

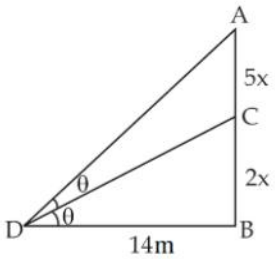


$$\tan 30° = \frac{40}{x}$$
$$\frac{1}{\sqrt{3}} = \frac{40}{x}$$
$$\Rightarrow x = 40\sqrt{3}\text{ m}$$

24.(4)

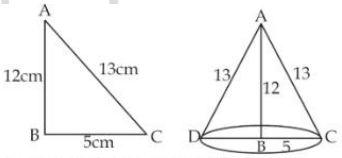
A		B		C		
4	:	5	:	6	=	15
						×6000
						90,000
		2				
		×6000				
		12000				

25.(4) Let, BC = 2x, then CA = 5x
∴ AB = 7x
ATQ,



∠ADC = ∠CDB = θ and BD = 14 cm
In ΔBDC, $\tan\theta = \frac{BC}{BD} = \frac{2x}{14} = \frac{x}{7}$
In ΔABD, $\tan 2\theta = \frac{AB}{BD} = \frac{7x}{14} = \frac{x}{2}$
$$\Rightarrow \frac{2\tan\theta}{1-\tan^2\theta} = \frac{x}{2}$$
$$\Rightarrow \frac{2\left(\frac{x}{7}\right)}{1-\left(\frac{x}{7}\right)^2} = \frac{x}{2} \Rightarrow \frac{2x\times 7}{49-x^2} = \frac{x}{2}$$
$$\Rightarrow 49 - x^2 = 28 \Rightarrow x^2 = 21\ x = \sqrt{21}$$
$$\therefore \text{height of the pole AB} = 7x = 7\sqrt{21}$$

26.(3)



i.e. after revolution a cone of side 5 cm and height 12 cm is formed
∴ volume of cone $= \frac{1}{3}\pi r^2 h$
$= \frac{1}{3}\times\frac{22}{7}\times 5\times 5\times 12$
$= 100\pi$
$= 314\text{ cm}^3$

27.(3) $\frac{52}{100}\times 275 = 143.$

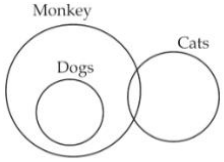
28.(4) Radius of well $= \frac{3}{2}$m
Height of well = 14 m
Let, height of empanelment = 'h' metre
Atq,
$$\pi\times\frac{9}{4}\times 14 = \pi\left(\frac{121}{4}-\frac{9}{4}\right)\times h$$
$$\Rightarrow h = \frac{9}{8}\text{m}$$

29.(1) Atq,
80 units → 6000 tons
1 units → $\frac{6000}{80}$ tons
So,
360 units → $\frac{6000}{80}\times 360 = 27000$ tons

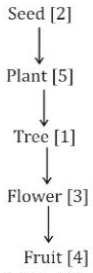
30.(1) A = 40 + 37 + 35 + 27 = 139
B = 6 + 26 +76 + 86 = 194
C = 83 + 71 + 4 + 21 = 179
D = 1 + 7 + 3 + 11 = 22
So, party D won the least number of seats.

31.(3) Total numbers of girls in the row
=23+37 – 1 =59

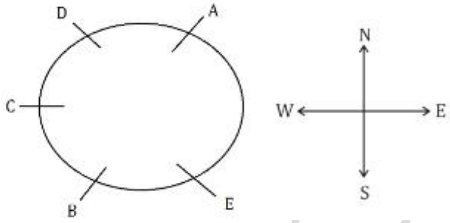
32.(2)
33.(1)
34.(4)
35.(1) I + VI + VII
36.(2)



37.(1) uvwv, uvwwvu/uvwwvu/uvw
38.(1)



39.(2) J K J K L J K L M J K L M N
40.(3) 17 triangles
41.(4)



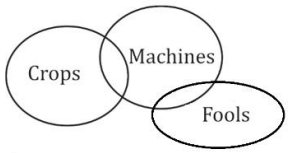
42.(3)

D A N G F R
↓ ↓ ↓ ↓ ↓ ↓
1 4 5 2 3 7

R A N C O R
↓ ↓ ↓ ↓ ↓ ↓
7 4 5 9 6 7

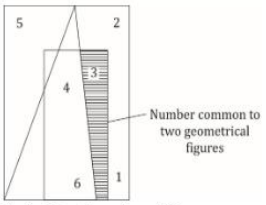
R A G E
↓ ↓ ↓ ↓
7 4 2 3

43.(3) 80 + 20 ÷ 5 – 12 × 92
Atq,
80 ÷ 20 – 5 × 12 + 92
= 4 – 60 + 92
= 96 – 60 = 36
44.(2) Four year ago, age of Arjun = 15 – 4 = 11 yrs
And, four yrs ago, age of Bheem = 26 -10 = 16 yrs
So, Required ratio = 11 : 16
45.(2) (+2, +2, +2) pattern
46.(4) +5 pattern series
47.(4) $2 + 2^2 = 6$
$6 + 3^2 = 15$
$15 + 4^2 = 31$
$31 + 5^2 = 56$
48.(1) Two series, one with difference of +2 and other with difference -2.
49.(2) (-2, +3) pattern
50.(3) ×2 – 2 pattern
51.(1)



I. ✓
II. ×
Only conclusion I follows

52.(2)



Note: Numbers 4 and 6 are common to all three geometrical figures.

53.(4) In the first row, (48-28)×3=60
In the second row, (7 – 5)× 3=6
In the third row, (27-14)×3=39
∴ The missing number in the fourth row
= (16-7)×3=27
54.(2) 408 ÷ 4 – 39 + 12 × 7
= 102 – 39 + 84 = 147
55.(1)
56.(4) The Kharosthi Script was more or less contemporarily with the Brahmi script, appearing around the 3rd century BCE mainly in modern-day northern Pakistan and eastern Afghanistan.
57.(2) The term regur is used for black soil.
58.(3) Article 280 provides for a Finance Commission as a quasi-judicial body. It is constituted by the President every fifth year or even earlier. The distribution of the net proceeds of taxes to be shared between the Centre and the states and the allocation between the states, the respective shares of such proceeds are based on recommendation of Finance Commission.
59.(4) An imperfect market refers to any economic market that does not meet the rigorous standards of a hypothetical perfectly (or "purely") competitive market. Market imperfections of a country are reflected in Price rigidity, Factor immobility & Lack of specialization.
60.(1) The South Asian Nitrogen Hub (SANH) is a major international research programme to tackle the challenge that nitrogen pollution poses for environment, food security, human health and the economy in South Asia.
61.(3) Kailasa temple is one of the largest rock-cut ancient Hindu temples located in Ellora, Maharashtra, India. A megalith carved out of one single rock, it is considered one of the most remarkable cave temples in India because of its size, architecture and sculptural treatment.
62.(1) Huge deposits of natural uranium, which promise to be one of the top 20 of the world's reserves, have been found in the Tummalapalle belt in the southern part of the Kadapa basin in Andhra Pradesh.
63.(3) Dr. Neelam Sanjiva Reddy is 6th president from 1977-82. In 1977, he was elected unopposed as President of India.
64.(3) The First Lok Sabha was constituted on 17 April 1952 after India's first general election. The 1st Lok Sabha lasted its full tenure of five years and was dissolved on 4 April 1957.

65.(2) As per the National Sample Survey Office's (NSSO's) periodic labor force survey (PLFS), India's unemployment rate hit a 45 year high of 6.1% in 2017-18.

66.(4) Lakshadweep is about 220 to 440 Kms away from the cost of Kerala, lying one of the world's most spectacular tropical Islands systems in a scattered group of 36 coral islands. All these islands have been built up by corals and have fringing coral reefs very close to their shores.

67.(3) In 1867, Dadabhai Naoroji put forward the 'drain of wealth' theory in which he stated that the Britain was completely draining India. He mentioned this theory in his book Poverty and Un-British Rule in India.

68.(2) President is the head of the state of India.

69.(4) In economics, the Lorenz curve is a graphical representation of the distribution of income or of wealth.

70.(3) Former finance minister and senior Congress leader P Chidambaram expressed disapproval of the Madhya Pradesh government's decision to slap NSA for alleged cow slaughter, saying the party leadership has conveyed its reservations to the state leadership. Speaking at the launch of his book "Undaunted:Saving the Idea of India".

71.(1) Magnesium oxide is mild base therefore it turn red litmus blue while oxides of Sulphur,Phosporus and Carbon are acidic in nature so they did not effect red litmus but turn blue litmus into red.

72.(3) In a gas, the particles are very far away from each other, so there is a lot of space for the particles to be compressed down in to. Thus Gases are highly compressable.This is very helpful when transporting gases in containers.

73.(4) Hydrogen Bond is weakest bond between atoms.Occur in molecules that have covelent bonds. Sometimes the electrons are not equally shared; one atom tends to have an electron more often than the other atom. In this situation one atom of the molecule becomes partly negative and the other then becomes partly positive. This is especially common between water molecules.

74.(1) The brain's limbic system controls emotional expression through the hypothalamus, which has control over the body's emotional responses systems. The hypothalamus is responsible for regulating hunger, thirst, response to pain, levels of pleasure, sexual satisfaction, anger and aggressive behavior, etc.

75.(3) An organism that transmits a disease agent from an infected to a non-infected animal or plant is known as vector.

76.(2) The endocrine glands are widely distributed throughout the body. The pituitary gland, pineal gland and hypothalamus are located in the skull. The thyroid and parathyroid glands are in the neck, and the thymus gland is in the thoracic (chest) cavity.

77.(3) Denitrification is the biological conversion of nitrate to nitrogen gas, nitric oxide or nitrous oxide. It refers to nitrate reduction by bacterial species such as Pseudomonas and Clostridium, usually in anaerobic conditions that ultimately produces molecular nitrogen (N_2). These bacteria use nitrate as an electron acceptor instead of oxygen during respiration.

78.(2) There are primarily three types of sugar: glucose, fructose and sucrose. Of the three sugars, fructose is the sweetest and glucose the least sweet, so typically less fructose can be used than table sugar.

79.(4) Photoperiodism is the development responses of plants to the relative lengths of light and dark periods. It affects the vegetative growth as well as the time of flowering and fruiting in plants.

80.(4) Proteins from animals are called 'first class' proteins – they provide all the essential amino acids, including those that the body can't make. Proteins from plants are 'second class' proteins.

81.(4) Tungsten metal is used as filament in lighting bulbs.

82.(2) The principle of atomic bomb is based on nuclear fission while fusion weapons are referred as thermonuclear bombs or hydrogen bomb.

83.(3) In the field of Physics watt is measurement of power, describing the rate at which electricity is being used at a specific moment.

84.(1) The optical fibre is a very thin strand of glass or plastic cable for transmitting light from one point to another. They work on the principle of total internal reflection. There is no loss of signal through an optical fibre.

85.(1) There are two types of particle in the nucleus of an atom the proton and the neutron.

86.(3) Baking soda is also known as Sodium bicarbonate. It is a chemical compound with the formula $NaHCO_3$. It is a salt composed of sodium ions and bicarbonate ions. Sodium bicarbonate is a white solid that is crystalline but often appears as a fine powder.

87.(2) There are two elements that are liquid in room temperature which are Bromine (Br) and Mercury (Hg).

88.(3) Endothermic process describes a process or reaction in which the system absorbs energy from its surroundings. Sweating is a endothermic reaction.

89.(2) Benzene was first discovered by the English scientist Michael Faraday in 1825

90.(4) Acids are not bad conductor of electricity in aqueous solution.

91.(1) When we see an object, the image formed on the retina is real and inverted.

92.(4) The amount of translational kinetic energy that an object has depends upon two variables: the mass (m) of the object and the speed (v) of the object.

93.(2) Kinetic Energy is form of energy which is the supplied heat energy stored during change in temperature of substance.

94.(3) In order to convert a Galvanometer into voltmeter, a very high resistance known as "series resistance" is connected in series with the galvanometer.

95.(2) Even after sunset, the air near the Earth's surface continues to receive heat due to Terrestrial Radiation.

96.(1) When pure water changes into the ice at 4°C, the density of ice so formed is 1/9th of the density of water. Therefore, in pure water, 90% part of the ice must be below the surface of the water and remaining 10% part must be above the surface. Sea water has high density (salty) water but the ice formed by it is pure and not salty. Therefore option (a) is correct.

97.(2) Human body has different resistances, when dry, resistance is 100,000 ohms. When wet because of sweat or water, resistance is only 1,000 ohms.

98.(1) Energy $\propto 1/(\text{wave length})$
The energy of any of the colour is inversely proportional to its wavelength. According the VIBGYOR violet, Indigo

and blue have the minimum wavelength, thus they have maximum energy level. So according to the options given in the question, blue has the maximum energy while red had the minimum energy.

99. (3) The smaller units of measuring mass are Milligram, Microgram, Pikogram and Femtogram.
1 Pikogram = 10^{-12} gram

100. (3) Luxmeter is used to measure the intensity of light, while colorimeter is a device used to measure the intensity of colour.