

RRB Junior Engineer - 1st Stage Grand Test – RRB-JE-T1 – 190309

HINTS & SOLUTIONS

ANSWER KEY

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

HINTS & SOLUTIONS

1. (4) $1080 = 2^3 \times 3^3 \times 5$
 $1440 = 2^5 \times 3^2 \times 5$
 $3600 = 2^4 \times 3^2 \times 5^2$
 Considering the product of common factors having smaller power among all the three
 Required HCF = $2^3 \times 3^2 \times 5 = 360$
- 2.(3) $\left(\frac{1}{9}\right)^{10} \times (27)^{20} \times \left(\frac{2}{3}\right)^5 = \left[\frac{1}{3^2}\right]^{10} \times [3^3]^{20} \times \left[\frac{2}{3}\right]^5$
 Here, 3 occurs 35 times and 2 occurs 5 times
 So, the number of prime factor $35 + 5 = 40$
- 3.(3) Recurring decimal occurs when we have any number other than 2 and 5 in the denominator.

4.(2) Area of circle = 154
 $\Rightarrow \frac{22}{7} \times r^2 = 154$
 $\Rightarrow r = 7$ cm
 Now,
 $2\pi r = 4a$
 $\Rightarrow 2 \times \frac{22}{7} \times 7 = 4 \times a$
 $\Rightarrow a = 11$ cm
 Area of square = 121 sq. cm

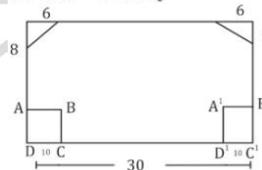
5.(2) Area of three consecutive face = $\ell b = bh = h\ell = 16$ cm²
 Volume of cuboid = $\ell \times b \times h$
 Here, $\ell b \times bh \times h\ell = 16 \times 16 \times 16$
 $\Rightarrow \ell^2 b^2 h^2 = \sqrt{16 \times 16 \times 16}$
 $\Rightarrow \ell bh = 16\sqrt{4 \times 4} = 16 \times 2 \times 2 = 64$ cm³

6.(2) ATQ,
 $(2M + 3B) \times 14 = (3M + 2B) \times 12 = \text{total work}$
 $\Rightarrow 14M + 21B = 18M + 12B$
 $\Rightarrow 9B = 4M = \frac{M}{B} = \frac{9}{4}$
 $\therefore \text{Total work} = (2M + 3B) \times 14$
 $= (2 \times 9 + 3 \times 4) \times 14$
 $= (18 + 12) \times 14 = 420$
 $\therefore \text{Required no. of days} = \frac{420}{2 \times 9 + 4 \times 1} = \frac{420}{18 + 4}$
 $= \frac{420}{22} = \frac{210}{11} = 19 \frac{1}{11}$ days

7.(1) $\frac{6-5}{6 \times 5} + \frac{7-6}{7 \times 6} + \frac{8-7}{8 \times 7} + \dots + \frac{(n+1)-n}{(n+1)(n)}$
 $= \frac{1}{5} - \frac{1}{6} + \frac{1}{6} - \frac{1}{7} + \dots - \frac{1}{24} + \frac{1}{25}$
 $\Rightarrow \frac{1}{5} - \frac{1}{25}$
 $\Rightarrow \frac{4}{25} \Rightarrow 0.16$

8.(1) Since, $\Delta AOP \cong \Delta AOQ$
 $\therefore \angle AOP = \angle AOQ$

9.(1)



Each side of square = $\frac{40}{4} = 10$ cm
 $\therefore \text{Total area of the two removed square} = 2 \times 10^2 = 20\text{m}^2$
 Total area of the two removed right triangle = $2 \times \frac{1}{2} \times 6 \times 8 = 48 \text{ m}^2$
 Total area of rectangular plot = $20 \times 30 = 600 \text{ m}^2$
 $\therefore \text{area of the remaining part} = 600 - 200 - 48 = 352 \text{ m}^2$

10.(4) $\frac{\text{surface area of A}}{\text{Surface area of B}} = \frac{4\pi r_1^2}{4\pi r_2^2} = \frac{r_1^2}{r_2^2}$
 r_1, r_2 are radii
 $\frac{40 \times 40}{10 \times 10} = \frac{16}{1}$

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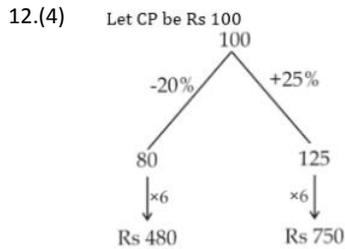


11.(4) → Train → speed → s km/h
 → 3 km/h → Man 1
 → 5 km/h → Man 2
 Relative speed of train with Man 1 = $(s-3)$
 Relative speed of train with Man 2 = $(s-5)$

	I	II
Ratio of time	12	15
	4	5

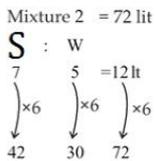
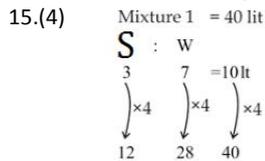
Ratio of relative speed 5 : 4

ATQ,
 $\frac{s-3}{s-5} = \frac{5}{4} \Rightarrow 4(s-3) = 5(s-5)$
 $\Rightarrow 4s - 12 = 5s - 25$
 $\Rightarrow s = 13$ km/h

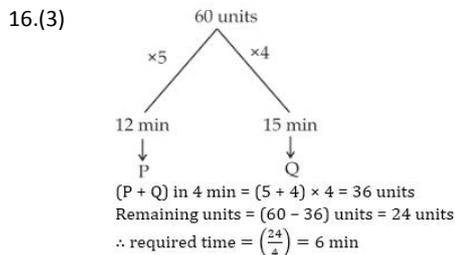


13.(4) Total stock = $(70 \times 9000) + (70 \times 9000) + (82 \times 49000) + (88 \times 49000) + (37 \times 27000) = \text{Rs } 10589000 = 105.89$ lakh

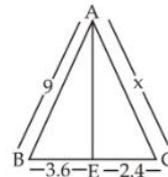
14.(4) Increase in height = $175 - 105 = 70$ cm



	S	:	W
I	→	12	: 28
II	→	42	: 30
I + II	→	54	: 58
I + II	→	27	: 29



17.(4)



By internal angle bisector theorem,

$$\frac{AB}{AC} = \frac{BE}{CE}$$

$$\frac{9}{x} = \frac{3.6}{2.4}$$

$$AC = 6 \text{ cm}$$

18.(1)

$$3^3 \times 3^{-4} = 3^{-1}$$

19.(3)

$$\tan \theta = \frac{P}{B} = \frac{8}{15}, H = 17 \text{ units}$$

Now,

$$\frac{\frac{P}{H}}{\frac{B}{H}} = \frac{8}{15} \times \frac{17}{15} = \frac{-51}{40}$$

On comparing

$$K = 51$$

20.(1)

Total contribution = Rs 3636

Let no. of members be x

Amount of Rs collected = $\text{Rs } x \times x$

Amount of paise collected = $x \times \frac{x}{100} = \frac{x^2}{100}$

Now,

ATQ,

$$x^2 + \frac{x^2}{100} = 3636$$

$$\Rightarrow \frac{100x^2 + x^2}{100} = 3636$$

$$\Rightarrow \frac{101x^2}{100} = 3636$$

$$\Rightarrow x^2 = \frac{3636 \times 100}{101}$$

$$x = 60$$

21.(4)

Unit digit of $(3537)^{154} \times (451)^{72}$

$$= (7)^{154} \times (1)^{72}$$

7 has cyclicity of 4

$$\therefore \frac{154}{4} \Rightarrow R = 2$$

$$= (7)^2 \times (1)^{72}$$

$$= 9 \times 1 = 9$$

22.(2)

$$0.7 + \sqrt{0.16} = 1.1$$

$$1.02 - \frac{0.6}{24} = 0.995$$

$$1.2 \times 0.83 = 0.996$$

$$\sqrt{1.44} = 1.2$$

Hence, the greatest number = $\sqrt{1.44}$

23.(4)

Let the sides be $3x, 4x$ and $5x$ respectively.

Here,

$$(3x)^2 + (4x)^2 = (5x)^2 \text{ (follows Pythagoras Theorem)}$$

$$\therefore \frac{1}{2} 3x \times 4x = 216$$

$$6x^2 = 216$$

$$x = 6$$

Therefore, the perimeter = $12 \times 6 = 72$

24.(4)

Place value of 5 is 50000

Place value of 9 is 9

Difference $50000 - 9$

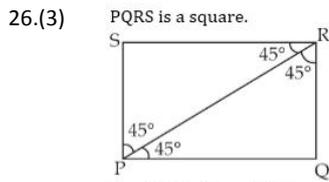
$$= 49991$$

25.(1)

$$CP = 375, \quad SP = 360$$

$$\text{Loss\%} = \frac{15}{375} \times 100 = 4\%$$

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$$(\tan^2 45^\circ + 1) \times \sin^2 45^\circ = (1 + 1) \times \frac{1}{2} = 1$$

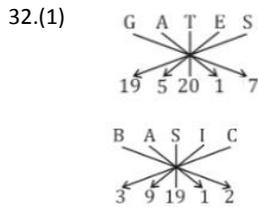
27.(1) If $\tan A \cdot \tan B = 1$
Then $(A + B) = 90^\circ$
Here,
 $\tan 3\theta \cdot \tan 5\theta = 1$
 $3\theta + 5\theta = 90^\circ$
 $8\theta = 90^\circ$
 $\theta = \frac{90}{8} = 11.5^\circ$

28.(4) ATQ,
 $\pi r^2 h = 2156$
 $\frac{22}{7} \times r^2 \times 14 = 2156$
 $r^2 = 49$
 $r = 7\text{cm}$

29.(4) Cost price = original price + Additional cost = $3200 + 100 + 700 = \text{Rs } 4000$
Selling price = Rs 3500
Since, selling price is less than the cost price
So, total loss = $4000 - 3500 = \text{Rs } 500$
Percentage loss = $\frac{500}{4000} \times 100 = 12\frac{1}{2}\%$

30.(1) Increase in compound interest for second year is Rs 50
This interest of Rs 50 is being compounded on Rs 1000
So, rate = $\frac{30 \times 1000}{1000} = 5\%$
Principal = $\frac{S.I. \times 100}{\text{time} \times \text{rate}} = \frac{1000 \times 100}{5} = \text{Rs } 20,000$

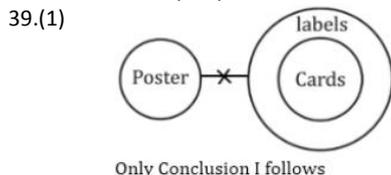
31.(2) Ore is obtained from Mine similarly, crop is obtained from farm



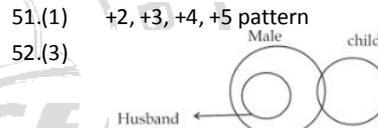
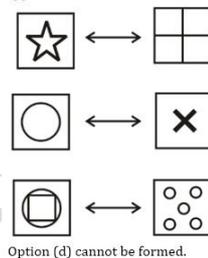
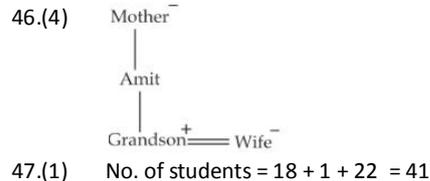
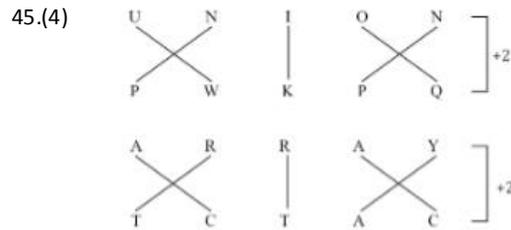
33.(2) Gang
34.(1) Gang
35.(2) $13 + 8 \times 2 \div 25 - 10 = 13 - 8 + 2 \times 25 \div 10 = 13 - 8 + 5 = 10$

36.(2) Tetrahedron is 3- D figure

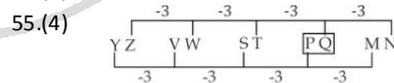
37.(2)
38.(3) $3!5 = (3 \times 5) 2 = 30$
 $5!8 = (5 \times 8) 2 = 80$
 $6!1 = (6 \times 1) 2 = 12$
 $\therefore 2!2 = (2 \times 2) 2 = 8$



40.(1) +4, +2, +5 pattern
41.(2) (+1, +1, +1, +1) pattern with second alphabet in upper case.
42.(1) Difference of 10, 15, 20 and 25
43.(3) $\times 2, +2$ pattern
44.(4) Difference of 0.5, 1, 1.5, 2



53.(4) Opposite faces are
 $\beta \rightarrow \alpha$
 $\infty \rightarrow \theta$
 $\delta \rightarrow \Psi$
Option (d) can be formed.
54.(1) -1 Series



56.(4) Kamarupa (or Kamrupa, or even Kamrup) was an ancient Indian region in south-eastern Bengal and Assam. It was known as Pragjyotisha in mythology.
57.(4) About 90% of the ozone in the Earth's atmosphere is found in the region called the Stratosphere. This is the atmospheric layer between 16 and 48 kilometers (10 and 30 miles) above the Earth's surface.
58.(4) The American Constitution was the first complete written national constitution. Thus the tradition of written constitution began with America.
59.(3) Yohei Sasakawa, who is Goodwill Ambassador of the WHO for Leprosy Eradication, has been conferred the Gandhi Peace Prize for 2018.
60.(1) Supply-side economics is the theory that says increased production drives economic growth. So, the supply-side economics lays greater emphasis on Producer. The factor of production are capital, labour, entrepreneurship, and land.
61.(4) Brihat Samhita is work of of Varāhamihira, It covers wide ranging subjects of human interest, including astrology,

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- planetary movements, eclipses, rainfall, clouds, architecture and growth of crops.
- 62.(1) Chloro fluoro carbon is the greenhouse gas having the greatest heat trapping ability.
- 63.(2) The maximum strength of the council is fixed at one-third of the total strength of the assembly and the minimum strength is fixed. It means that the size of the council depends on the size of the assembly of the concerned state.
- 64.(3) Increase in the stock of unsold articles is not an investment. An investment is the purchase of goods that are not consumed today but are used in the future to create wealth.
- 65.(4) President Ramnath Kovind conferred the Bharat Ratna, the nation's highest civilian honour, on former President Pranab Mukherjee, along with social activist Nanaji Deshmukh (posthumous), and Assamese musician Bhupen Hazarika (posthumous).
- 66.(1) In his famous speech 'Freedom at midnight', the first prime minister of the country, Jawaharlal Nehru mentioned, "The ambition of the greatest men of our generation has been to wipe every tear from every eye. That may be beyond us, but as long as there are tears and suffering, so long our work will not be over."
- 67.(1) As of January 2019, there have been 103 amendments to the Constitution of India since it was first enacted in 1950.. There are two types of amendments to the constitution which are governed by article 368.
- 68.(1) Capitalism is an economic system based upon private ownership of the means of production and their operation for profit
- 69.(4) Hariprasad Chaurasia is world famous flute player.
- 70.(3) The 13th edition of G20 summit 2018 will be held at Buenos Aires, the capital of Argentina on November 30 under the theme 'Building Consensus for Fair and Sustainable Development'.
- 71.(2) Soda water was invented by Joseph Priestley.
- 72.(1) Protons and neutrons have nearly the same mass while electrons are much less massive.
- 73.(4) An acoelomate is defined as an animal that does not possess a body cavity. Unlike coelomates (eucoelomates), animals with a true body cavity, acoelomates lack a fluid-filled cavity between the body wall and digestive tract
- 74.(2) Binomial nomenclature is a formal system of naming species of living things by giving each a name composed of two parts, both of which use Latin grammatical forms.
- 75.(3) The members of rhodophyceae are generally called red algae, as it imparts often a red colour to the thallus. There are about 400 genera and 4000 species of red algae.
- 76.(1) The members of Chlorophyceae are commonly called Green algae. The members of Chlorophyceae generally grow in fresh water (about 90%) and the rest in saline water, terrestrial habitat etc.
- 77.(1) The coelom is the main body cavity in most animals lined by mesoderm and is positioned inside the body to surround and contain the digestive tract and other organs.
- 78.(1) In females, the uterus is single.
- 79.(2) The members of Phaeophyceae are popularly called brown algae. Members of Chlorophyceae are commonly called green algae. The Rhodophyceae or the Red algae is probably the oldest groups of Eukaryotic Algae.
- 80.(4) Non-photochemical quenching (NPQ) is a mechanism employed by plants and algae to protect themselves from the adverse effects of high light intensity.
- 81.(3) Electrons move around the nucleus in orbital motion.
- 82.(2) Sphygmomanometers is an instrument for measuring blood pressure, particularly in arteries. The two types of sphygmomanometers are a mercury column and a gauge with a dial face.
- 83.(2) The reflecting telescope invented by Sir Isaac Newton in 1671.
- 84.(2) We know that-
Number of unit = kilowatt hour = watt x hour /1000
=(60×30×5)/1000=9 unit.
- 85.(2) According to a report of Department of Atomic Energy in India, there are approximately 10.70 million tons of monazite, which contains 9,63,000 tons of Thorium Oxide (ThO₂). India is one country that has an abundance of thorium. Andhra Pradesh has 35% of thorium reserve of India.
- 86.(1) Atoms bond with each other to reduce potential energy and gain stability.
- 87.(2) Acetone is a colorless, flammable liquid that evaporates easily. In cosmetics, the most common use of acetone is in nail polish remover.
- 88.(3) Redox reaction is the reaction in which oxidation and reduction occurs simultaneously. Rust of iron is nothing but hydrate of iron oxide and iron (III) oxide -hydroxide.
- 89.(3) A Cation is a positively-charged ion, while an anion is negatively charged. Sulphate is an anion.
- 90.(4) Smog is a type of air pollutant. It is composed of nitrogen oxides, sulphur oxides, ozone, smoke or particulates among others (less visible pollutants include carbon monoxide, CFCs and radioactive sources).
- 91.(4) Optical fibre work on the principle of Total Internal Reflection of Light. In optical fibre, when light traveling in an optically dense medium hits a boundary at a steep angle (larger than the critical angle for the boundary), the light is completely reflected. This is called total internal reflection.
- 92.(2) Water Tank appears shallower when viewed from the top due to refraction of light. This virtual depth is known as apparent depth.
- 93.(2) Yellow colour is formed when Red and Green are mixed.
- 94.(4) The SI unit of frequency is the hertz (Hz), named after the German physicist Heinrich Hertz; one hertz means that an event repeats once per second.
- 95.(2) Wood is a good insulator.
- 96.(2) Manometer is an instrument that uses a column of liquid to measure pressure, commonly referred as pressure measuring instrument.
- 97.(2) Mainly there are two types of devices that are used to measure solar radiations these are: (i) Pyrheliometer (ii) Pyranometer.
- 98.(2) The shape of a drop of rain is constrained by the surface tension, which tries to give it the shape for which the surface area is minimum for the given volume. The spherical shape has the minimum surface area. That's why rain drops acquire spherical shape.
- 99.(1) Soap bubbles are large because when soap dissolved in water its surface tension is reduced. The pressure inside a soap bubble is more than atmospheric pressure.

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- 100.(2) Control rod constitutes a real-time control of fission Process which is crucial for both keeping the fusion chain reaction active and preventing it from accelerating beyond control. These rods are composed of chemical elements such as boron, silver, indium and cadmium.

