

RRB Junior Engineer - 1st Stage Grand Test – RRB-JE-T1 – 190308

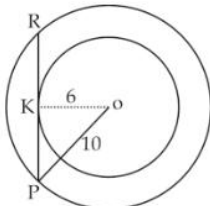
HINTS & SOLUTIONS

ANSWER KEY

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

HINTS & SOLUTIONS

1.(3)



ΔOKP is a right angle Δ
(6, 8, 10) are triplets
 $\therefore KP = 8$

OK is perpendicular to PR and OK bisects PR
 $\therefore PR = 2 \times KP = 2 \times 8 = 16$ cm

2.(2)

Given,

$$\frac{2x}{3x^2 - 5x + 3} = \frac{2}{x(3x - 5 + \frac{3}{x})} = \frac{2}{3(x + \frac{3}{x}) - 5} = \frac{2}{3 \times 6 - 5} = \frac{2}{18 - 5} = \frac{2}{13}$$

3.(1)

Avg. cost = $\frac{(3 \times 100000) + (2 \times 80000) + (3 \times 45000)}{(3 + 2 + 3)}$
= Rs 74375

4.(4)

Required value = $(7.3)^2 + (2.7)^2 + 2 \times 7.3 \times 2.7$
= $(7.3 + 2.7)^2 = 100$

5.(1)

Let the present ages of Hari and Mohan be respectively x yrs and y yrs
From the question, $x + y = 2(x - y)$
Or $x = 3y$... (i)
4 yrs before the ages of Hari and Mohan was $x - 4$ yrs and $y - 4$ year then
From the question $(x - 4 + y - 4) = \frac{3}{2}[x - 4 - y + 4]$
Or, $2x + 2y - 16 = 3x - 3y$
Or, $5y - x = 16$... (ii)
Solving equation (i) and (ii)
 $x = 24$ and $y = 8$
Hari's age after 12 yrs = $24 + 12 = 36$ yr
Mohan's age after 12 yrs = $8 + 12 = 20$ yrs
the ratio of their ages = $36 : 20 = 9 : 5$

6.(4)

Sand Gravel Cement
17 8 $\times 3$
6 17 $\times 4$
Sand : Cement = $17 \times 3 : 17 \times 4$
= 3 : 4

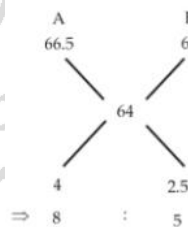
7.(3)

29% \rightarrow 435
1% \rightarrow 15
200% \rightarrow 3000

8.(3)

In AP.
Sum of 10 terms = 390
 $\Rightarrow S_n = \frac{n}{2} [2a + (n - 1)d]$
 $\Rightarrow 390 = \frac{10}{2} [2a + 9d]$
 $\Rightarrow 2a + 9d = 78$... (i)
And $T_n = a + (n - 1)d$
 $14 = a + 2d$... (ii)
Solving equation (i) and (ii) we get
 $a = -6$

9.(1)



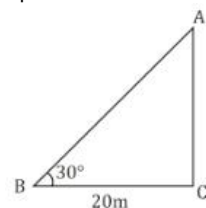
10.(4)

$12.3 \times 0.456 = 5.6088$

11.(3)

Square root of 4489 is 67.

12.(2)

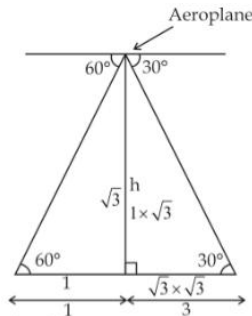


$\tan 30^\circ = \frac{AC}{BC} \Rightarrow \frac{1}{\sqrt{3}} = \frac{AC}{20} \Rightarrow AC = \frac{20}{\sqrt{3}}$

13.(3)

We have $a^2 + \frac{1}{a^2} = 38$
 $\therefore \left(a - \frac{1}{a}\right)^2 = a^2 + \frac{1}{a^2} - 2 = 38 - 2 = 36$
 $\Rightarrow a - \frac{1}{a} = 6$

14.(2)



$(1 + 3)$ units \rightarrow 800
 $\sqrt{3}$ units $\rightarrow 200\sqrt{3} = 346.4$ m

15.(1)

Export in 2012 = $1000 \times \frac{10}{11}$
 $= \frac{10000}{11}$ crore
 Export in 2013 = $3200 - \frac{10000}{11}$
 $= \frac{25200}{11}$ crore
 Import in 2013 = $\frac{25200}{11} \times \frac{9}{10}$
 $= 2061.81$ crore
 ≈ 2062 crore

16.(1)

Total duration from 10 pm to 6 am is 8 hours. Required time = $(10 + 25)\%$ of 8 hours = 2.8 hours

17.(4)

1 day's work of B = $\frac{1}{15}$
 6 day's work of B = $6 \times \frac{1}{15} = \frac{2}{5}$
 Rest work = $1 - \frac{2}{5} = \frac{3}{5}$ part
 \therefore 1 work is done by A in 12 days
 $\therefore \frac{3}{5}$ work is done by A in $\frac{12 \times 3}{5} = \frac{36}{5}$ days
 A will complete the rest work in $\frac{36}{5}$ days

18.(2)

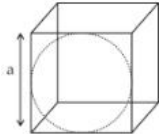
$a \sin \theta + b \cos \theta = c$
 Let, $a \cos \theta - b \sin \theta = x$
 Squaring both the equation and adding
 $a^2 \sin^2 \theta + b^2 \cos^2 \theta + 2ab \sin \theta \cos \theta + a^2 \cos^2 \theta + b^2 \sin^2 \theta - 2ab \sin \theta \cos \theta = c^2 + x^2$
 $\Rightarrow a^2 (\sin^2 \theta + \cos^2 \theta) + b^2 (\cos^2 \theta + \sin^2 \theta) = c^2 + x^2$
 $a^2 + b^2 = c^2 + x^2$
 $x = \pm \sqrt{a^2 + b^2 - c^2}$

19.(1)

$\cot \frac{4\pi}{3} = \cot \left(\pi + \frac{\pi}{3} \right)$
 $= \cot \frac{\pi}{3}$
 $= \frac{1}{\sqrt{3}}$

20.(2)

Side of cube = 14 cm



Radius of largest sphere = $\frac{a}{2}$
 \therefore Volume of sphere = $\frac{4}{3} \pi r^3$
 $= \frac{4}{3} \times \frac{22}{7} \times \frac{14}{2} \times \frac{14}{2} \times \frac{14}{2}$
 $= 1437.33 \text{ cm}^3$

21.(3)

Let two numbers be A & B
 $A : B$
 $2 : 5$
 \downarrow
 $200x : 500x$
 Where x is constant.
 Now, ATQ,
 $200x \times 20\% + 20 = 500x \times 10\% + 15$
 $\Rightarrow 40x + 20 = 50x + 15$
 $\Rightarrow 10x = 5$
 $\Rightarrow x = \frac{1}{2}$
 Larger number = 250

22.(3)

Average speed = $\frac{2 \times 40 \times 80}{40 + 80} = \frac{160}{3}$
 $= 53 \frac{1}{3}$ km/hr

23.(2)

Let CP be x
 Atq,
 $SPI = \frac{x}{2} \times \frac{140}{100} = \frac{7}{10}x$
 $SP II = \frac{x}{4} \times \frac{60}{100} = \frac{3}{20}x$
 $SP III = \frac{x}{4}$
 Total SP = $\frac{7}{10}x + \frac{3}{20}x + \frac{x}{4} = \frac{11}{10}x$
 Profit % = $\frac{1}{10} \times 100\% = 10\%$

24.(4)

$\frac{x(x-1)}{2} - x = 35$
 $x^2 - 3x - 70 = 0$
 $(x - 10)(x + 7) = 0$
 $x = 10 \text{ \& } x \neq -7$

25.(1)

$\angle SRT = 90^\circ$ (angle in semicircle)
 $\angle QRT + \angle SRT + \angle PRS = 180^\circ$
 $\angle PRS = 180^\circ - (30^\circ + 90^\circ)$
 $\angle PRS = 60^\circ$
 $R = 8 \frac{3}{4}\% = \frac{35}{4}\% = \frac{7}{80}$

26.(1)

	Principal	Amount
I \rightarrow	$(80)_{187}$	$(87)_{187}$
II \rightarrow	6400	7569

\therefore Total principle = $80 \times 87 + 6400$
 $\Rightarrow 13360$ units \rightarrow Rs 26720
 Installment, 7569 units \rightarrow Rs 15,138

27.(4)

Effective interest for CI for 2 year
 $= 5 + 5 + \frac{5 \times 5}{100} = 10.25\%$
 Interest for 3 years at SI = $6 \times 3 = 18$
 Now, ATQ,
 $10.25\% \rightarrow$ Rs 287
 $\therefore 18\% \rightarrow \frac{287}{10.25} \times 18 =$ Rs 504

28.(2)

$19 - \frac{1}{4} \{12 - 8\}$
 $= 18$

29.(1)

Place value of 4 = 400
 Face value of 4 = 4
 So, required difference = $400 - 4 = 396$

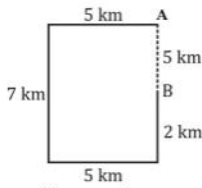
30.(1)

$46656 = 2^6 \times 3^6$
 $\sqrt[3]{46656} = 36$

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31.(1)



AB = 5 km south

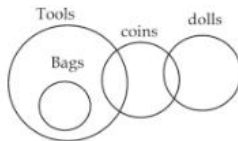
32.(2) KGJH

33.(3) Atq,
 $\frac{2x+10}{3x+10} = \frac{4}{5}$
 $\Rightarrow x = 5$

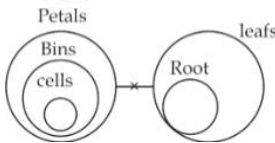
Arun's present age = $3x + 5 = 20$ yrs

After 5 yrs = 25 yrs

34.(1)

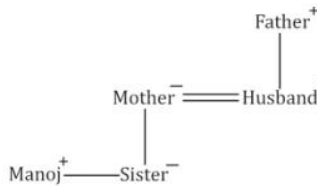


35.(3)



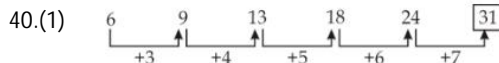
36.(2) - 3 difference between alternate terms written in reverse order.

37.(1)



38.(2)

39.(3) C J K



40.(1) $(1 + 4) - (2) = 3$ $(7 + 1) - (1 + 5) = 2$ Similarly, $(1 + 9) - (5 + 1) = 4$

41.(1)

42.(1) Both are synonyms

43.(3) $4 \times 7 = 28$

Similarly, $13 \times 7 = 91$

44.(1) $7 - 4 = 3$; $13 - 10 = 3$

$21 - 18 = 3$; $27 - 23 = 4 \neq 3$

45.(4) Except option (c), all other have a difference of 17.

46.(3)

47.(4)

48.(1) Mayank is happy \longrightarrow ku tap pi(1)
 Happy are make \longrightarrow tap le fu.....(2)
 Make is happy \longrightarrow fu pi tap(3)
 From (1) & (2) happy \longrightarrow tap

49.(2)

LATIN \longrightarrow ODWLQ
 +3 pattern
 Similarly, ROUTE \longrightarrow URXWH

50.(1) +3 Series

51.(2) $6^2 - (1 + 5 + 3) = 27$

$5^2 - (9 + 4 + 2) = 10$

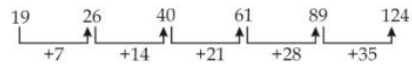
Similarly, $8^2 - (20 + 3 + 4) = 32$

52.(1) Removing the vowels and writing the word in reverse.

53.(1) Odd Number | 7 | Even Number

2 times 7 follow required condition.

54.(1)



55.(1) A/c to Mayank, examination can be on 19th or 20th December.

A/c to Suraj examination can be on 20th, 21st, 22nd or 23rd Dec.

From Both observationS, 20th is common.

\therefore Examination is on 20th December.

56.(3) Brihadeshwara is the title referring Lord Shiva enshrined in the Tanjore Big Temple built by Raja Raja Chola I and consecrated more than a thousand years back in 1010 AD. It is located in Tanjavur.

57.(1) A Western Disturbance is an extratropical storm originating in the Mediterranean region that brings sudden winter rain to the northwestern parts of the Indian subcontinent.

58.(4) Marina Beach in Chennai is the longest natural beach in India.

59.(3) Finance Bill is a bill introduced every year in Lok Sabha immediately after the presentation of the Union Budget, to give effect to the financial proposals of the Government of India.

60.(2) Odisha Chief Minister Naveen Patnaik has recently launched 'Ama Ghare LED' scheme, under which about 95 lakh families in the State will each get four LED bulbs free of cost.

61.(4) In the East India Company territories, the Ryotwari system was introduced by Thomas Munroe and Captain Reed first in Madras presidency. In this system, peasants were given the ownership and proprietorship and they would make direct payment to state as 55% of produce.

62.(3) Red soil is formed as a result of weathering of metamorphic and igneous rocks. The red colour of the soil comes from the high percentage of iron content. It is found on eastern and southern part of Deccan plateau.

63.(1) In the Northern Hemisphere, the December Solstice is the winter solstice and the shortest day of the year. The December solstice is on either December 21 or 22.

64.(2) The income method of calculating national income takes into account the income generated from the basic factors of production. These include the land, labor, capital, and organization

65.(2) Tamil Nadu was declared the 'Best State Overall' for its active participation in the national campaign 'Swastha Bharat Yatra'.

66.(3) Digambara monks do not wear any clothes. Svetambara "white-clad" is a term describing its ascetics practice of wearing white clothes.

67.(3) As highest court in the State, a High Court supervises the subordinate courts in the State.

68.(2) When the offices of the President and Vice-President fall vacant simultaneously, Chief Justice of India acts as President.

69.(1) The Eighth Plan could not take off in 1990 due to the fast changing political situation at the centre and the years 1990-91 and 1991-92 were treated as Annual Plans. The Eighth Plan was finally formulated for the period 1992-1997.

70.(1) Department of Industrial Policy and Promotion (DIPP) renamed as Department of promotion of Industry and Internal Trade. The newly named department is under Ministry of Commerce and Industry.

- 71.(1) Anthracite is a hard, compact variety of coal that has a submetallic luster. It has the highest carbon content (>90%), the fewest impurities, and the highest energy density of all types of coal except for graphite.
- 72.(1) Bee stings contain an acidic solution. Bee venom contains formic acid (also known as methanoic acid).
- 73.(4) Radioactive disintegration of uranium ultimately results in the formation of lead.
- 74.(3) Melting point of different metals are- Copper 1083°C, Gold 1063 °C, Silver 951 °C and Mercury –38.83°C.
- 75.(2) Nuclear forces are short range attractive forces that bound the nucleus against the repulsive electrostatic force between Protons.
- 76.(3) Goiter or goitre is enlargement of the thyroid gland. The most common cause for goitre is IODINE deficiency.
- 77.(4) All of these get affected in Weil's disease.
- 78.(3) Fear of water is known as hydrophobia. Such type of patients gets afraid from river, lake sea etc. Hydrophobia is the old name of Rabies which is a viral disease. Its virus affects the nervous system.
- 79.(3) Anthophobia is an abnormal and persistent fear of flowers. The term comes from the Greek roots Anthos means flower and Phobos means fear.
- 80.(2) Group AB has both A and B antigens on red cells (but neither A nor B antibody in the plasma).
- 81.(3) The lens used in CD player emit ultraviolet laser beams which produce sound after reflecting through the bright surface of C.D.
- 82.(4) Television signals cannot be received beyond a certain distance because the surface of the earth is curved, due to this the signals moves further without hitting the earth's surface.
- 83.(4) Human beings have stereoscopic vision (stereopsis) means having eyes at the front of their head. The two eyes are a few centimeters apart from each other. Due to this, two eyes see the same object from two slightly different angles and send two slightly different images to the brain. The brain combines these two images to build a three-dimensional picture of the object and we can judge the depth and distance of the object more accurately.
- 84.(2) The water remains cold in an earthen pitcher because of a physical process is known as evaporation, when liquid changes to a gaseous (or vapour) state without boiling, it is known as evaporation.
- 85.(3) Velocity of sound in air is 330m/sec.
- 86.(4) When an acid and a base are placed together, they react to neutralize the acid and base properties, producing a salt. The H(+) cation of the acid combines with the OH(-) anion of the base to form water.
- 87.(3) Zinc Phosphides is commonly used as Rodenticides. They are a category of pest control chemicals intended to kill rodents.
- 88.(4) Aspirin, also known as Acetyl Salicylic acid (ASA), is a medication used to treat pain, fever, or inflammation.
- 89.(3) The best example of changing into electric energy from chemical energy is primary cells or batteries, the dry cell is also made up in this phenomenon.
- 90.(3) Potassium Cyanide (KCN) or Zinc Phosphide is a highly toxic chemical used as a rodenticide a poison to kill the mouse.
- 91.(2) While frequency measures the cycle rate of the physical waveform, pitch is how high or low it sounds when you hear it. Pitch and Frequency are related to each other. A high pitch sound corresponds to a high frequency sound wave and a low pitch sound corresponds to a low frequency sound wave.
- 92.(3) The photoelectric effect is an phenomenon in which the emission of electrons occurs when a beam of light strikes a metal or a cathode surface. For emissions of electrons frequency of incident light is required to be greater than a minimum value called Threshold Frequency. Thus, show particle nature of light.
- 93.(4) An electric motor is an electrical machine that converts electrical energy into mechanical energy.
- 94.(4) A convex mirror provides for a larger field of view than a plane mirror. They are used whenever a mirror with a large field of view is needed. For example, the passenger-side rear view mirror on a car is convex.
- 95.(1) Evangelista Torricelli is universally accepted as inventor of Barometer. Charles Xavier Thomas invented mechanical calculator. Edward Teller is known as "the father of the hydrogen bomb". Gustav Tauschek developed numerous improvements for punched card-based calculating machines.
- 96.(1) The moment arm or lever arm is the perpendicular distance between the line of action of the force and the center of moments. Moment Arm is the perpendicular distance between point of application of force and axis of rotation.
- 97.(2) Candela is not the unit of distance. Candela is a unit of Luminous Intensity.
- 98.(3) The apparent weight of a person in a lift which is moving down with uniform acceleration is less than the weight when the person is stationary.
- 99.(2) Water Tank appears shallower when viewed from the top due to refraction of light. This virtual depth is known as apparent depth.
- 100.(2) Yellow colour is formed when Red and Green are mixed.