

Mathematics Mega Quiz for RRB NTPC (Solutions)

S1. Ans.(b)

Sol.

$$\cos \theta = \frac{15}{17}$$

$$\sin \theta = \sqrt{1 - \cos^2 \theta}$$

$$= \sqrt{1 - \frac{225}{289}}$$

$$= \sqrt{\frac{64}{289}}$$

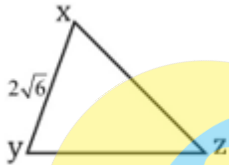
$$= \frac{8}{17}$$

$$\cot (90 - \theta) = \tan \theta$$

$$= \frac{8}{\frac{15}{17}} = \frac{8}{15}$$

S2. Ans.(b)

Sol.



$$xz^2 = yz^2 + (2\sqrt{6})^2$$

$$xz^2 - yz^2 = 24$$

$$(xz + yz) \times 2 = 24$$

$$xz + yz = 12$$

$$xz - yz = 2$$

$$\frac{xz}{yz} = 7$$

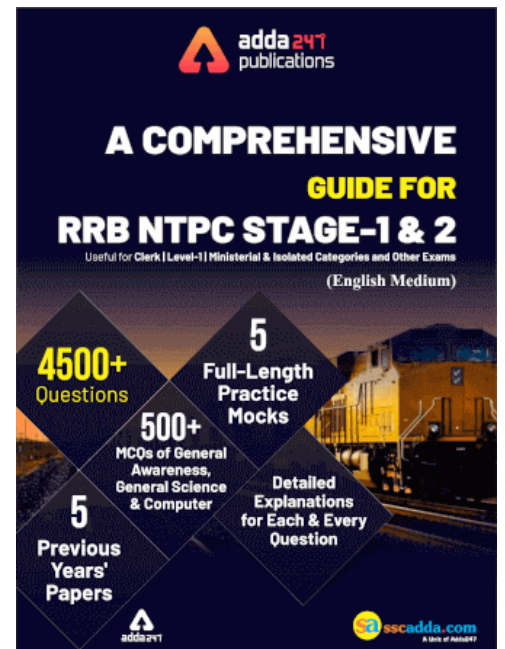
$$yz = 12$$

$$\sec x + \tan x$$

$$= \frac{7}{2\sqrt{6}} + \frac{5}{2\sqrt{6}}$$

$$= \frac{6}{\sqrt{6}} = \sqrt{6}$$

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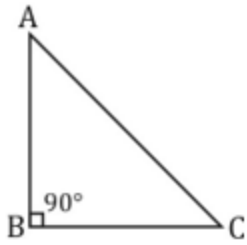
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S3. Ans.(b)**Sol.**

$$AB : BC = 2 : 1$$

$$AB = 2x, BC = x$$

$$AC^2 = 4x^2 + x^2$$

$$AC = \sqrt{5}x$$

$$\sin A + \cot C$$

$$= \frac{x}{\sqrt{5}x} + \frac{x}{2x}$$

$$= \frac{2 + \sqrt{5}}{2\sqrt{5}}$$

S4. Ans.(a)

$$\text{Sol. } \sin 21^\circ = \frac{x}{y}$$

$$\sin(90^\circ - 69^\circ) = \frac{x}{y}$$

$$\cos 69^\circ = \frac{x}{y}$$

$$\sin 69^\circ = \sqrt{1 - \cos^2 69^\circ}$$

$$= \frac{\sqrt{y^2 - x^2}}{y}$$

$$\cos 21^\circ = \frac{\sqrt{y^2 - x^2}}{y}$$

$$\Rightarrow \sec 21^\circ - \sin 69^\circ$$

$$= \frac{1}{\cos 21^\circ} - \sin 69^\circ$$

$$= \frac{y}{\sqrt{y^2 - x^2}} - \frac{\sqrt{y^2 - x^2}}{y}$$

$$= \frac{y^2 - y^2 + x^2}{y\sqrt{y^2 - x^2}}$$

$$= \frac{x^2}{y\sqrt{y^2 - x^2}}$$

S5. Ans.(d)

Sol. $7 \sin \alpha = 24 \cos \alpha$

$$\tan \alpha = \frac{24}{7}$$

$$H = \sqrt{576 + 49} = \sqrt{625} = 25$$

$$\cos \alpha = \frac{7}{25}$$

$$\sec \alpha = \frac{25}{7}$$

$$14 \tan \alpha - 75 \cos \alpha - 7 \sec \alpha$$

$$= 14 \times \frac{24}{7} - 75 \times \frac{7}{25} - 7 \times \frac{25}{7}$$

$$= 48 - 21 - 25 = 2$$

S6. Ans.(c)**Sol.**

$$\sqrt{3} \frac{\sin \theta}{\cos \theta} = 3 \sin \theta$$

$$\cos \theta = \frac{1}{\sqrt{3}}$$

$$\sin \theta = \sqrt{1 - \frac{1}{3}} = \sqrt{\frac{2}{3}}$$

$$\sin^2 \theta - \cos^2 \theta$$

$$= \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$$

S7. Ans.(c)**Sol.**

$$\sin \theta = \frac{a}{b}$$

$$\cos \theta = \frac{\sqrt{b^2 - a^2}}{b}$$

$$\sec \theta = \frac{b}{\sqrt{b^2 - a^2}}$$

$$\sec \theta - \cos \theta$$

$$= \frac{b}{\sqrt{b^2 - a^2}} - \frac{\sqrt{b^2 - a^2}}{b}$$

$$= \frac{b^2 - b^2 + a^2}{b\sqrt{b^2 - a^2}}$$

$$= \frac{a^2}{b\sqrt{b^2 - a^2}}$$

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S8. Ans.(a)

Sol.

$$\sec \theta + \tan \theta = 2 + \sqrt{5}$$

$$\sec \theta - \tan \theta = \frac{1}{\sqrt{5} + 2}$$

$$= \sqrt{5} - 2$$

$$2 \sec \theta = 2\sqrt{5}$$

$$\sec \theta = \sqrt{5}$$

$$\cos \theta = \frac{1}{\sqrt{5}}$$

$$\sin \theta = \frac{2}{\sqrt{5}}$$

$$\sin \theta + \cos \theta = \frac{2}{\sqrt{5}} + \frac{1}{\sqrt{5}}$$

$$= \frac{3}{\sqrt{5}}$$

S9. Ans.(c)

Sol.

$$\cot A + \operatorname{cosec} A = 3$$

$$\operatorname{cosec} A - \cot A = \frac{1}{3}$$

$$2 \operatorname{cosec} A = \frac{10}{3}$$

$$\operatorname{cosec} A = \frac{5}{3}$$

$$\sin A = \frac{3}{5}$$

S10. Ans.(c)

Sol.

$$\operatorname{cosec} \theta - \cot \theta = \frac{7}{2}$$

$$\operatorname{cosec} \theta + \cot \theta = \frac{2}{7}$$

$$2 \operatorname{cosec} \theta = \frac{7}{2} + \frac{2}{7}$$

$$2 \operatorname{cosec} \theta = \frac{53}{14}$$

$$\operatorname{cosec} \theta = \frac{53}{28}$$

S11. Ans.(d)

Sol.

A → 75% → $\frac{3}{4}$ work → 18 days

1 work → 24 days

B → 25% → $\frac{1}{4}$ work → 12 days

1 work → 48 days

A 24 2

48

B 48 1

75% of work = $\frac{3}{4} \times 48$

= 36

A + B, will complete 36 work in = $\frac{36}{3} = 12$ days

S12. Ans.(b)

Sol.

Area of 4 walls of cuboid = 57 m²

$2(l + b) \times h = 57$

$2(l + b) \times 3 = 57$

$5.5 + b = \frac{19}{2}$

$5.5 + b = 9.5$

$b = 4$ cm

S13. Ans.(d)

Sol.

Discount % = 30%

$= \frac{30}{100} = \frac{3}{10} \rightarrow$ Discount

$(10 - 3)r = 1050$

$7r \rightarrow 1050$

$1r \rightarrow 150$

$10r \rightarrow 1500$

S.P at 15% discount

$= 1500 \times \frac{17}{20}$

= 1275 Rs.

S14. Ans.(c)

Sol.

Fourth Proportion → x

$\frac{336}{288} = \frac{161}{x}$

$x = \frac{161 \times 288}{336}$

$x = 138$

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S15. Ans.(b)

Sol.

First number divisible by 8 \Rightarrow 16

Last number divisible by 8 \rightarrow 88

$$88 = 16 + (n - 1) 8$$

$$72 = (n - 1) 8$$

$$9 = n - 1$$

$$n = 10$$

$$\text{Sum} = \frac{10}{2} [2 \times 16 + (10 - 1) \times 8]$$

$$= 5 [32 + 72]$$

$$= 520$$

$$\text{Average} = \frac{520}{10} = 52$$

S16. Ans.(a)

Sol.

Using Alligation

$$15\% \quad 8\%$$

$$12\%$$

$$\frac{4}{3}$$

Quantity sold at 8%

$$= 630 \times \frac{3}{7}$$

$$= 270$$

S17. Ans.(d)

Sol.

50% of a = b

$$\frac{1}{2} a = b$$

$$b\% \text{ of } 40 = \frac{a}{200} \times 40$$

$$= 0.2a$$

S18. Ans.(c)

Sol.

Speed including stoppages = 50 km/hr

Distance travelled in 1 hour = 50 km

Time taken by train to travel 50 km at 120 km/hr

$$= \frac{50}{120}$$

$$= \frac{5}{12} \times 60 \text{ minutes}$$

$$= 25 \text{ minutes}$$

Train stopped per hour

$$= 60 - 25$$

$$= 35 \text{ minutes}$$

S19. Ans.(c)

Sol.

	SI	C.I
1 st year	2000	2000
2 nd year	2000	2180

Rate % $\Rightarrow \frac{180}{2000} \times 100$
 $= 9\%$

S20. Ans.(a)

Sol.

$$\frac{2x}{3} - \frac{5}{2} \left(\frac{4x}{5} - \frac{4}{3} \right) = \frac{1}{3}$$
$$\frac{2x}{3} - 2x + \frac{10}{3} = \frac{1}{3}$$
$$\frac{-4x}{3} = -3$$
$$x = \frac{9}{4}$$

S21. Ans.(a)

Sol. Using Alligation

5%	8%
6%	
2	1

S22. Ans.(c)

Sol.

	Milk	:	Water
I st Container \rightarrow	5	:	3
Milk	$= \frac{5}{8} = 0.625$		
Water	$= \frac{3}{8} = 0.375$		
	Milk	:	Water
II nd Container \rightarrow	2	:	1
Milk	$= \frac{2}{3} = 0.66$		
Water	$= \frac{1}{3} = 0.33$		
	Milk	:	Water
III rd Container \rightarrow	3	:	2
Milk	$= \frac{3}{5} = 0.6$		
Water	$= \frac{2}{5} = 0.4$		
	Milk	:	Water
IV th Container \rightarrow	7	:	4
Milk	$= \frac{7}{11} = 0.66$		
Water	$= \frac{4}{11} = 0.33$		

In Container \Rightarrow 3rd

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S23. Ans.(a)**Sol.**

Acid : Water

25 liters → 4 : 1

$$\text{Acid} = \frac{4}{5} \times 25 = 20$$

$$\text{Water} = \frac{1}{5} \times 25 = 5$$

New Acid : Water

20 : 8

5 : 2

S24. Ans.(d)**Sol.** Loan Amount : Total Interest = 5 : 2

Principal → 5

Interest for 1 year ⇒ 2

Interest for 5 year ⇒ 10

$$10 = \frac{5 \times r \times 5}{100}$$

$$r\% = 40\%$$

$$= \frac{40}{100} = \frac{2}{5}$$

$$P : r = 5 : 2/5$$

$$= 25 : 2$$

S25. Ans.(c)**Sol.** S.I for 2 years

$$= \frac{15600 \times 10 \times 2}{100}$$

$$= 3120 \text{ Rs.}$$

Principal after 2 years

$$= 15600 + 3120$$

$$= 18720 \text{ Rs.}$$

S.I for next 2 years

$$= \frac{18720 \times 10 \times 2}{100}$$

$$= 3744$$

Interest at the end of 4 years = 3744 Rs.

S26. Ans.(d)**Sol.** Case I

$$P = \frac{P \times 5 \times r}{100}$$

$$r = 20\%$$

Case II

$$2P = \frac{P \times 12 \times r}{100}$$

$$\frac{100}{6} = r$$

$$r = \frac{50}{3} = 16\frac{2}{3}\%$$

S27. Ans.(b)

Sol.

$$15 \times 20 \times 8 = 20 \times 12 \times x$$

$$x = 10 \text{ hours}$$

S28. Ans.(b)

Sol.

$$9 \times 20 = x \times 15$$

$$x = 12 \text{ taps}$$

S29. Ans.(d)

Sol.

$$\text{Efficiency} \rightarrow \text{Raj} + \text{Ram} = \frac{1}{10}$$

$$\text{Efficiency} \rightarrow \text{Raj} = \frac{1}{12}$$

$$\text{Efficiency Ram} = \frac{1}{10} - \frac{1}{12}$$

$$= \frac{6 - 5}{60}$$

$$= \frac{1}{60}$$

Ram will take $\Rightarrow 60$ days

S30. Ans.(c)

Sol.

$$\text{Let C.P} = 100$$

$$\text{S.P} = 90$$

$$90 + \frac{1}{2}x = x$$

$$90 = \frac{1}{2}x$$

$$x = 180$$

$$\text{C.P} \Rightarrow 100, \text{MP} = 180$$

$$\frac{\text{C.P}}{\text{M.P}} \Rightarrow \frac{100}{180} = \frac{5}{9}$$

$$\frac{\text{M.P}}{\text{C.P}} \Rightarrow \frac{180}{100} = \frac{9}{5}$$

C.P is $\frac{5}{9}$ of marked price.

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