Quantitative Aptitude for RRB NTPC (Solutions)

S1. Ans.(b)

Sol.

$$1+\frac{1}{\cot^2 63^\circ}-\sec^2 27^\circ+\frac{1}{\sin^2 63^\circ}-\operatorname{cosec}^2 27^\circ$$
$$=(1-\operatorname{cosec}^2 27^\circ)+\tan^2 63^\circ+\frac{1}{\sin^2 63^\circ}-\frac{1}{\cos^2 27^\circ}$$
$$=-\cot^2 27^\circ+\cot^2 27^\circ+\frac{1}{\sin^2 63^\circ}-\frac{1}{\sin^2 63^\circ}$$
$$=0$$

S2. Ans.(c)

Sol.

$\sin\frac{\pi x}{2}=x^2-2x+2$

Putting $x=1$

$\sin\frac{\pi}{2}=1-2+2$

$\sin\frac{\pi}{2}=1$

$1=1$

Satisfies

S3. Ans.(d)

Sol.

$\cos \pi x$

$=x^2-x+\frac{5}{4}$

Not satisfied by any option

S4. Ans.(b)

Sol.

$(1+\sin A)(1+\sin B)(1+\sin C)=(1-\sin A)(1-\sin B)(1-\sin C)$

$$\left(\frac{1+\sin A}{1-\sin A}\right)\left(\frac{1+\sin B}{1-\sin B}\right)\left(\frac{1+\sin C}{1-\sin C}\right)=1$$

$$\frac{(1+\sin A)^2}{\cos^2 A}\times\frac{(1+\sin B)^2}{\cos^2 B}\times\frac{(1+\sin C)^2}{\cos^2 C}=1$$

$[(1+\sin A)(1+\sin B)(1+\sin C)]^2=(\cos A\cos B\cos C)^2$

$(1+\sin A)(1+\sin B)(1+\sin C)=\cos A\cos B\cos C$

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S5. Ans.(a)
Sol.
$\cot 9° \cot 27° \cot 63° \cot 81°$
$= \cot (90 - 81°) \cot (90° - 63°) \cot 63° \cot 81°$
$= \tan 81° \tan 63° \cot 63° \cot 81°$
$= 1$

S6. Ans.(b)
Sol.
$\sin \theta = 0.7$
$\cos \theta = \sqrt{1 - \sin^2 \theta}$
$= \sqrt{1 - (0.7)^2}$
$= \sqrt{1 - 0.49}$
$= \sqrt{0.51}$

S7. Ans.(c)
Sol.
$\tan^2 + 3 = 3 \sec \theta$
Putting $\theta = 0°$
$\tan^2 0° + 3 = 3 \sec 0°$
$3 = 3$
Satisfies
Let $\theta = 60°$
$(\sqrt{3})^2 + 3 = 3 \times \sec 60°$
$6 = 3 \times 2$
$6 = 6$ satisfies

S8. Ans.(b)
Sol.
$\sin^2 65° + \sin^2 25° + \cos^2 35° + \cos^2 55°$
$= \sin^2 (90° - 25°) + \sin^2 25° + \cos^2 (90° - 55°) + \cos^2 55°$
$= \cos^2 25° + \sin^2 25° + \sin^2 55° + \cos^2 55°$
$= 1 + 1$
$= 2$

S9. Ans.(a)
Sol.
$\sin^2 7\frac{1}{2} + \sin^2 82\frac{1}{2} + \tan^2 2° . \tan^2 88°$
$= \sin^2 \left(90 - 82\frac{1}{2}\right) + \sin^2 82\frac{1}{2} + \tan^2 (90 - 88) \tan^2 88°$
$= \cos^2 82\frac{1}{2} + \sin^2 82\frac{1}{2} + \cot^2 88° + \tan^2 88°$
$= 1 + 1$
$= 2$

S10. Ans.(a)
Sol.

$1 - 2\sin^2\theta + \sin^4\theta$
$= (\sin^2)^2 + (1)^2 - 2\sin^2\theta$
$= (\sin^2\theta - 1)^2$
$= (\cos^2\theta)^2$
$= \cos^4\theta$

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S11. Ans.(c)
Sol.

Total surface area of Prism =
Curved surface area + 2 × area of base
608 = perimeter of base × height + 2 × area of base
$608 = 4x \times 15 + 2x^2$
$x^2 + 30x - 304 = 0$
$x = 8$
Volume of prism = Area of base × height
$= 8 \times 8 \times 15 = 960\ cm^3$

S12. Ans.(a)
Sol.

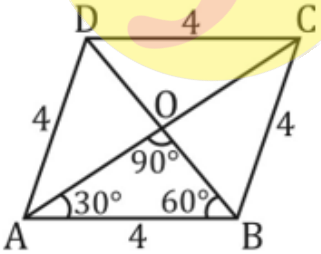
$D_1^2 + D_2^2 = 4a^2$
$64+36 = 4\ a^2$
$a^2 = 25$

S13. Ans.(a)
Sol.

$\frac{2}{3}\pi r^3 = 19404$
$r = 21$ cm
Total surface area $= 3\pi r^2 = 4158\ cm^3$

S14. Ans.(d)
Sol.

According to the question.



Given: ∠B = 120°
In a rhombus diagonal are angle bisector and diagonal cut at right triangle.

$\therefore \sin 30° = \frac{P}{H} = \frac{BO}{AB} = \frac{1}{2} = \frac{BO}{4}$

BO = 2 cm
∴ BD = 2 × BO
= 2 × 2 = 4 cm

S15. Ans.(a)

Sol.

$\left(x+\frac{1}{x}\right)^2=3$

$x+\frac{1}{x}=\sqrt{3}$ then, Power of difference 6 is cancel out.

$x^6=-1$

So,

$x^{72}+x^{66}+x^{54}+x^{36}+x^{24}+x^6+1$

$=(x^6)^{12}+(x^6)^{11}+(x^6)^9+(x^6)^6+(x^6)^4+x^6+1$

$=1$

S16. Ans.(c)

Sol.

$a+b+c=0$

$b+c=-a$

Squaring on both sides.

$(b+c)^2=a^2$

$a^2+b^2+c^2+2bc=2a^2$

$a^2+b^2+c^2=2a^2-2bc=2(a^2-bc)$

$\Rightarrow\frac{(a^2+b^2+c^2)}{(a^2-bc)}=2$

S17. Ans.(b)

Sol.

$n=7+4\sqrt{3}=4+3+2\times2\times\sqrt{3}=\left(2+\sqrt{3}\right)^2$

$\sqrt{n}=2+\sqrt{3}$

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

$\left(\sqrt{n}+\frac{1}{\sqrt{n}}\right)=4$

S18. Ans.(b)

Sol.

$(a+b+c)^2=a^2+b^2+c^2+2(ab+bc+ca)$

$36=14+2(ab+bc+ca)$

$ab+bc+ca=11$ .....(i)

$a^3+b^3+c^3-3abc=(a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$=36-3abc=6(14-11)$

$36-3abc=84-66=18$

$3abc=36-18=18$

$abc=6$

S19. Ans.(d)

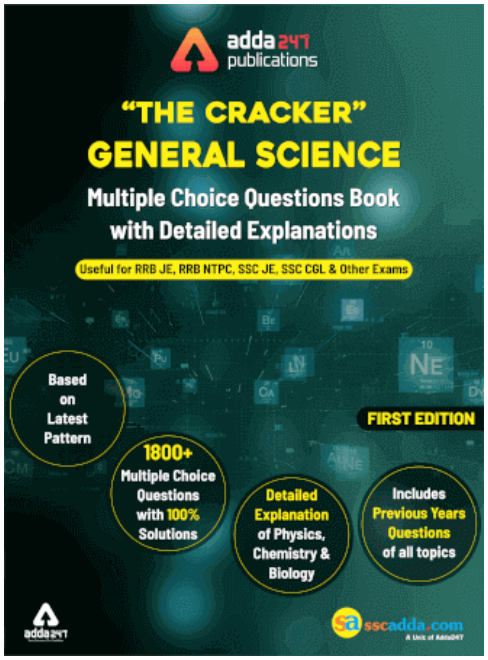
Sol.

$(a-1)\sqrt{2}+3=b\sqrt{2}+a$

$a=3, a-1=b$

$3-1=b\Rightarrow b=2$

$a+b=5$

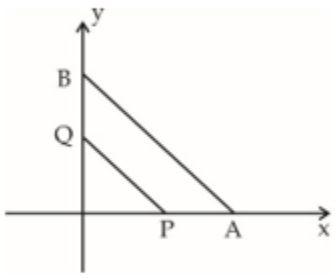


S20. Ans.(b)

Sol.

$OP = \sqrt{(2-0)^2 + (0-0)^2} = 2$

$OQ = \sqrt{(0-0)^2 + (3/2-0)^2} = 3/2$



$PQ = \sqrt{OP^2 + OQ^2}$

$= \sqrt{4 + \left(\frac{3}{2}\right)^2} = \sqrt{\frac{25}{4}} = 2.5$ cm

S21. Ans.(d)

Sol.

x : y ⇒ 2 : 3

x → 2k, y → 3k

2k + 5 = 3k – 5

k = 10

No. of balls in each bag

= 2 × 10 + 5

= 25

S22. Ans.(c)

Sol.

$(x + y)^2 = 4xy$

$x^2 + y^2 + 2xy = 4xy$

$x^2 + y^2 - 2xy = 0$

$(x - y)^2 = 0$

x – y = 0

x = y

Ratio → 1 : 1

S23. Ans.(d)

Sol.

Ratio → 1 : 2 : 3

Ratio after adding 5 → 2 : 3 : 4

(2 – 1) or (3 – 2) or (4 – 3)r → 5

1r → 5

Numbers → 1 × 5, 2 × 5, 3 × 5

⇒ 5, 10, 15

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S24. Ans.(a)

Sol.

E + S + M = 180

E : M → 2 : 3

E → 2x, M → 3x

E = 2S

2x = 2S

S = x

2x + 3x + x = 180

x = 30

Marks in Science = 30

S25. Ans.(d)

Sol.

Using Alligation

10.20 14.40

12.60

1.80	:	2.40
180	:	240
3	:	4

S26. Ans.(a)

Sol.

	Milk	:	Water			
A →	4	:	3	→	Milk	→ $\frac{4}{7}$
B →	2	:	3	→	Milk	→ $\frac{2}{5}$
C →	1	:	1	→	Milk	→ $\frac{1}{2}$

Using Alligation

$\frac{4}{7}$ $\frac{2}{5}$

$\frac{1}{2}$

$\frac{1}{2}-\frac{2}{5}$	:	$\frac{4}{7}-\frac{1}{2}$
$\frac{5-4}{10}$	:	$\frac{8-7}{14}$
14	:	10
7	:	5

S27. Ans.(b)

Sol.

Acid is 1st sample = 2/3
Water is 1st sample = 1/3
Acid is 2nd sample = 3/5
Water is 2nd sample = 2/5
Acid is 3rd sample = 5/8
Water is 3rd sample = 3/8
Acid is Mixture

$$= \frac{2}{3} + \frac{3}{5} + \frac{5}{8}$$
$$= \frac{80 + 72 + 75}{120}$$
$$= \frac{227}{120}$$

Water is Mixture

$$= \frac{1}{3} + \frac{2}{5} + \frac{3}{8}$$
$$= \frac{40 + 48 + 45}{120}$$
$$= \frac{133}{120}$$

Acid : Water

$$= \frac{227}{120} : \frac{133}{120}$$

S28. Ans.(b)

Sol.

P on 1st Jan = 5200
Rate = 10%
Rate on 1st July = $5200 \times \frac{10}{100} = 520$
P on 1st July = 5200 + 520 + 5200= 10920
Rate on 31st December = $10920 \times \frac{10}{100} = 1092$
Total Rate = 1092 + 520= 1612 Rs.

S29. Ans.(a)

Sol.

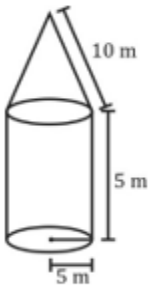
Let 2 digit no. be → xy
x + y = 8
10x + y + 36 = 10y + x
9y – 9x = 36

$$\begin{array}{rrrrr} y & - & x & = & 4 \\ y & + & x & = & 8 \\ \hline 2y & & & = & 12 \end{array}$$

y = 6
x = 2
Number is = 26

S30. Ans.(b)

Sol.



Curved Surface area of conical part = πrl

$= \frac{22}{7} \times 5 \times 10$

$= \frac{1100}{7}$

Curved surface area of cylindrical part = 2πrh

$= 2 \times \frac{22}{7} \times 5 \times 6$

$= \frac{1320}{7}$

Total Area

$= \frac{1100}{7} + \frac{1320}{7}$

$= \frac{2420}{7}$

$= 345.7\ m^2$

20% extra for canvasing & folding = $345.7 \times \frac{1}{5} = 69.14$

Total area = 345.7 + 69.14= 414.84 m^2

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