NTSE STAGE – I (HARYANA STATE)
(For Class – X)
SET - C
MENTAL ABILITY TEST (MAT)
HINTS & SOLUTIONS

1. 2
1. By observation.

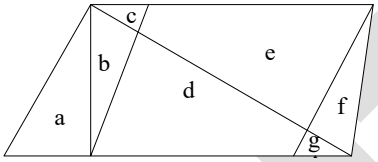
2. 1
2. 1st figure + 3rd figure = 2nd figure

3. 3
3. The pattern is bcab / bcab / bcab / bcab / bcab

4. 4
4. The time taken will be $\frac{30}{55} = \frac{60}{11} = 5\frac{5}{11}$ min.

   So, required time is 7: $5\frac{5}{11}$

5. 4
5. Number of quadrilaterals = 13

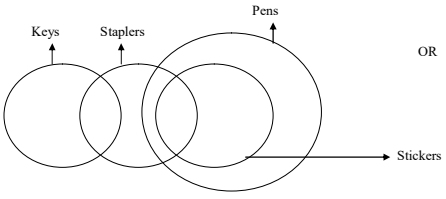


Quadrilaterals are: d, e, ab, ef, de, bd, abc, abd, bcde, defg, abcde, bcdefg, abcdefg.

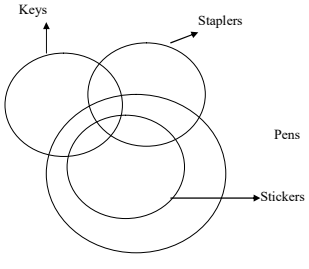
6. 4
6. As per observation

7. 1
7. F is the wife of M who is the father of K.
   F3M5K

8. 4
8. The possible venn diagram are



OR



So, I and IV follows and either II or III follow.

9. 3 or 4
9. Two options are possible with the following logic:

$123 = 11^2 + 2$ and $13^2 = (11+2)^2$

$235 = 15^2 + 10 \Rightarrow$ answer $= (15+10)^2 = 25^2$

Also,

$123 = (13)^2$ means (first digit / last digit) second digit

Similarly 235 will means $(25)^3$

10. 3

10.

Top	8	7	6	5	4	3	2	1 Ground
	A	B	D	F	E	C	G	H

11. 4

11.

Top	8	7	6	5	4	3	2	1 Ground
	A	B	D	F	E	C	G	H

12. 2

12.

Top	8	7	6	5	4	3	2	1 Ground
	A	B	D	F	E	C	G	H

13. 1

13.

Top	8	7	6	5	4	3	2	1 Ground
	A	B	D	F	E	C	G	H

14. 1

14. The numbers are 4, 24, 40, 44, 48

15. 1

15. 1, 3, 9,; 2, 5, 6,; 4, 7, 8

16. 3

16. Mirror image will be formed on each fold, so by observation we can say 3rd image will be formed.

17. 4

17. Z = 26
ACT = 2 + 6 + 40 = 48
BAT = 4 + 2 + 40 = 46

18. 1

18. Correct order is Torque, Torrid, Torso, Tortoise, Tortuous

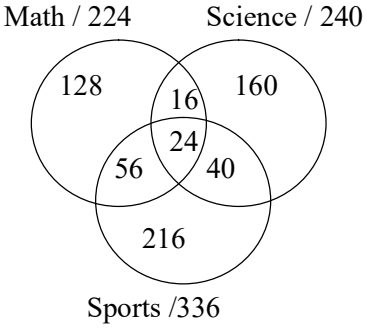
19. 3

19. By observation.

20. 4

20. Rapid and slow are antonyms whereas the other pairs of words are either very similar or almost same in intensity.

21. 2
21. By observation.

22. 4
22. 

Total – 880
Who participates – 880 – (128 + 160 + 216 + 24 + 16 + 56 + 40)
880 – 640 = 240
Not participate – 240
$\frac{240}{880} \times 100 = 27.27$

23. 3
23. Who choose only one subject = (128 + 160 + 216) = 504
$\frac{504}{880} \times 100 = 57.27 < 60$

24. 1
24. Total hours $\rightarrow$ (24 x 3) + 17 = 89 hrs
= $23 + \frac{44}{60}$ hrs of faulty time = 24 hrs of true time
= $\frac{356}{15}$ hrs $\rightarrow 24$ hrs
1 hr $\rightarrow \frac{24 \times 15}{356}$
89 hrs $\rightarrow \frac{24 \times 15}{356} \times 89 = 90$ hrs
So, true time is 1 hrs more than faulty time 10 pm + 1 hr = 11 pm

25. 2
25. By observation

26. 4
26. In first row 4 + 2 = 6 ÷ 2 = 3
In second row 5 + 3 + 1 + 1 = 10 ÷ 2 = 5
In third row 6 + 1 + 2 + 3 + 3 + 1 = 16 ÷ 2 = 8

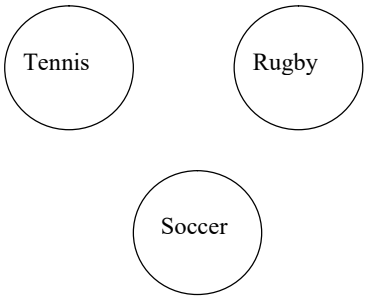
In fourth row 7 + 2 + 4 + 3 = 16 ÷ 2 = 8
So, 9 + 3 = 12 ÷ 2 = 6

27. 3
27. By observation

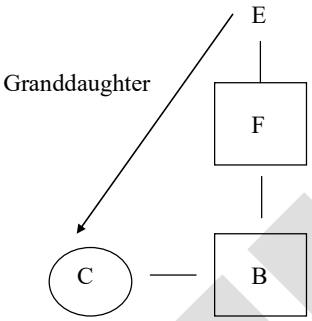
28. 3
28. Advertisement → Application → Interview → Selection → Appointment → Probation

29. 3
29. Malaria is a disease in a same way spear is a weapon.

30. 2
30.



31. 3
31.



32. 4
32. □ → O O, Δ → O O O
So, □□ → O O O O

33. 4
33. By observation

34. No option correct
34. By observation

35. 3
35. By observation

36. 3
36. By observation

37. 3
37. By observation.

38. 4
38. Let sons age 10 years age be x.
Fathers age 10 year ago = 3x

$2(x+20)=(3x+20)$

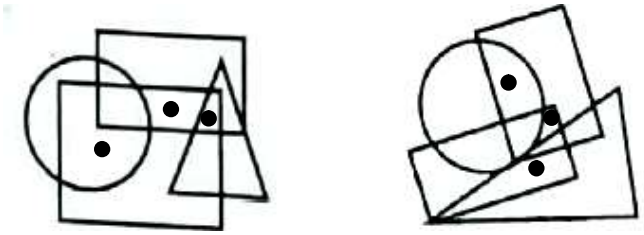
x = 20

10 year ago father's age = 60 years and son's age = 20 years

Ratio of their present age = 70 : 30 = 7:3

39. 1 or 4

39.



40. 3

40. In a single carom tournament, there is only one winner so 79 students should be eliminated by 79 matches.

41. 2

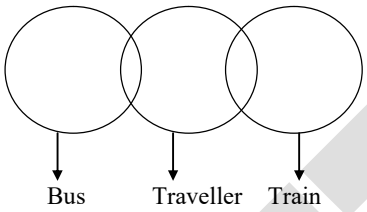
41. In 1hr it climbs 5 m

$\therefore$ in 8 hrs it climbs 40 m

$\therefore$ in 9th hr it will first touch 50 cm

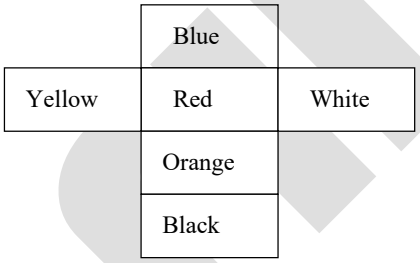
42. 3

42.



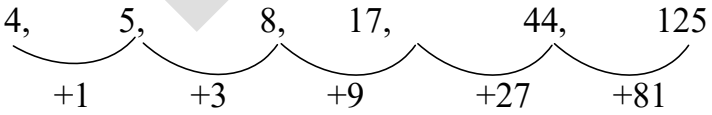
43. 1

43.



44. 3

44.



45. 3

45. 5 x 8 = 40

6 x 8 = 48

9 x 8 = 72

46. 2

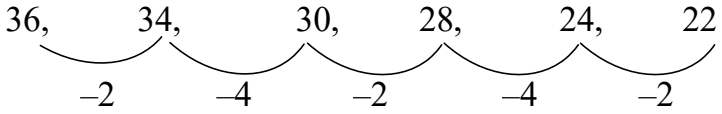
46. x $\rightarrow$ +

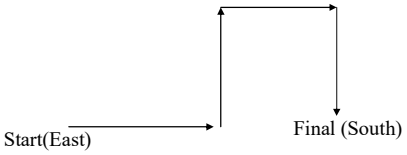
< $\rightarrow$ –

+ $\rightarrow \div$

$> \rightarrow x$
$- \rightarrow =$
$\div \rightarrow >$
$= \rightarrow <$
$5 > 2 + 2 = 10 < 4 \times 8$
$5 \times 2 \div < 10 - 4 + 8$
$5 < 14$

47. 2
47. As per observation.

48. 2
48. 

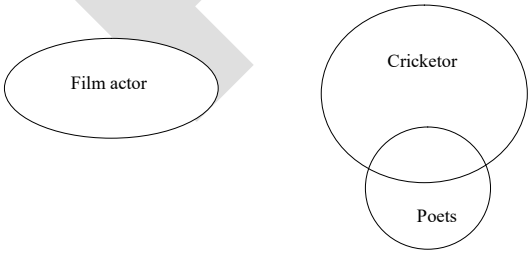
49. 1
49. 

50. 1
50. As per observation

51. 2
51. As per observation.

52. 4
52. As per observation.

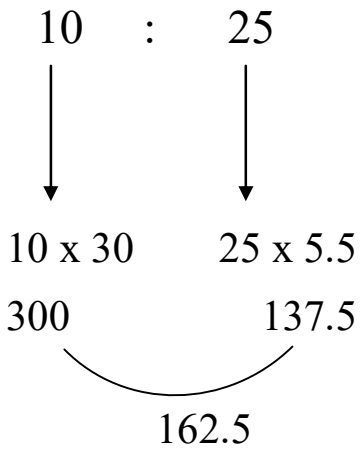
53. 1
53. $7 + 2 + 4 + 9 = 22$
$3 + 11 + 2 + 6 = 22$
$5 + 5 + 6 + 6 = 22$
$8 + 1 + 4 + \boxed{9} = 22$

54. 2
54. 

55. 4
55. In 2000 years there are 0 odd days.
From 1st Jan to 1st April total odd days = 3 + 0 + 3 + 1 = 0
$\therefore$ 1st April 2001 was Sunday
$\therefore$ 4t April was 1st Wednesday

56. 4

56.



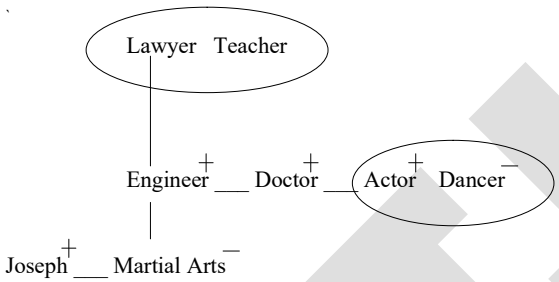
∴ Reflex angle = 197.5

57. 4

57. Monk is a person who is devoted to a god/religion. In the same way, A rover is a person who loves travelling and wanderlust is the impulse to travel.

58. 4

58.



59. 2

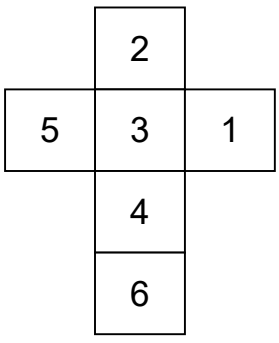
59. GNQ = 7 + 14 + 17 = 38
RBS = 18 + 2 + 19 = 39
TUA = 20 + 21 + 1 = 42
FPC = 6 + 16 + 3 = 25
OLH = 15 + 12 + 8 = 35

60. 4

60. nso ptr kli chn → sharma get marriage gift
ptr lnm wop chn → wife gives marriage gift
tti wop nhi → he gives nothing

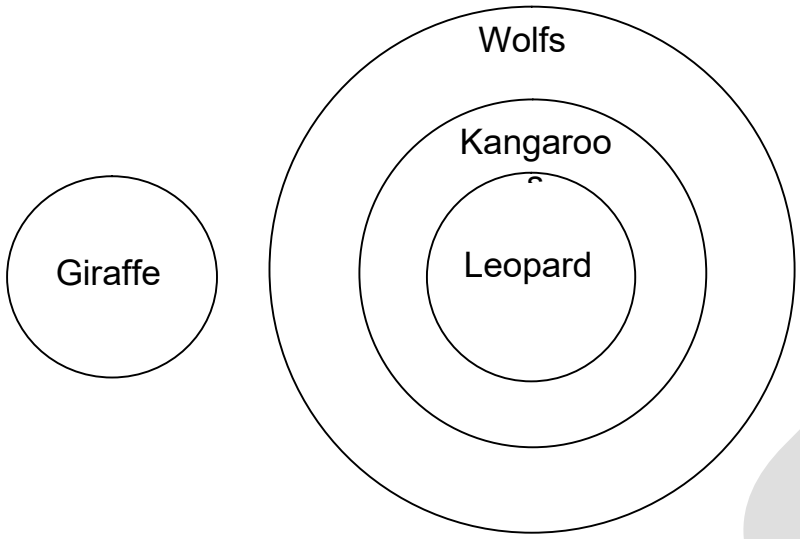
61. 3

61.



62. 1

62.



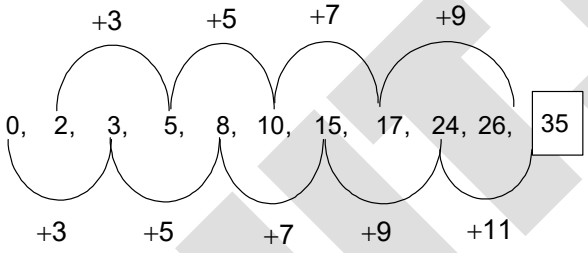
63. 3

63.

	K	G	H	R	J
Intelligent	✓	✓	✓		
Hard working	✓			✓	✓
Honest			✓	✓	✓
Ambitious	✓	✓			✓

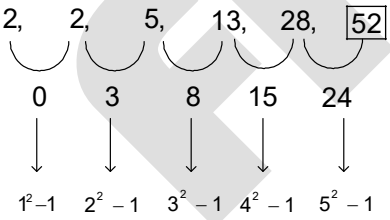
64. 4

64.



65. 4

65.



66. 1

66. As per observation.

67. 4

67. U N I F O R M I T Y
R M I T Y U N I F O

68. 2

68. $\frac{5\times3\times4\times2}{10}=12$

$\frac{5\times6\times2\times3}{10}=18$

Similarly, $\frac{5\times2\times2\times9}{10}=18$

69. 3

69. $6\times4=3\times8$

$18\times3=2\times27$

$15\times\boxed{3}=5\times9$

70. 1

70. NICE, because I is not present.

71. 2

71. Let correct = x

Incorrect = y

$\therefore$ x + y = 75

4x – y = 125

$\Rightarrow$ $\boxed{x=40}$

72. 3

72. As per observation.

73. 4

73. As per observation.

74. 4

74. 1st bunch = x

2nd bunch = y

$\therefore\ x=y+\frac{1}{4}y$

$\therefore\ x=\frac{5}{4}y...(1)$

& x – y = 3 …(2)

$\therefore$ x = 15

75. 4

75. 664, 332, 340, 170, 178, 89

÷ 2 +8 ÷ 2 +8 ÷ 2

76. 4

76. $\frac{12}{4}=\frac{21}{7}=3$

$\frac{10}{5}=\frac{4}{2}=2$

$\frac{64}{8}=\frac{24}{3}=8$

$\therefore$ 83

77. 1

77. 2 9 7 3 1 7 3 7 7 1 3 3 1 7 3 8 5 7 1 3 7 7 1 7 3 9 0 6

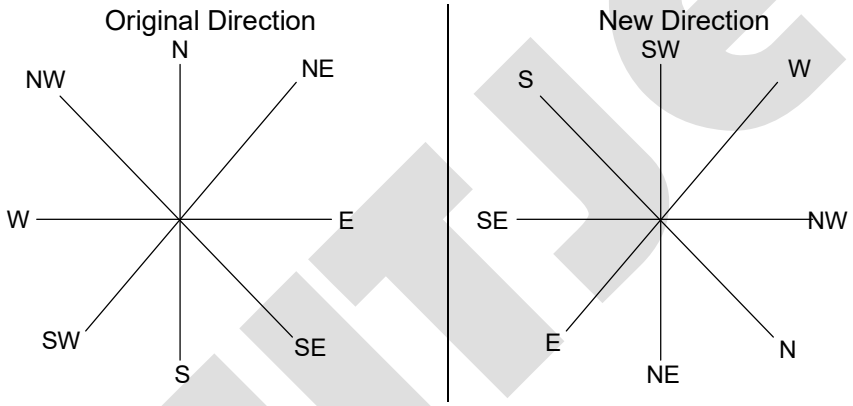
78. 2
78. As per observation.

79. 2
79. As per observation

80. 2
80. 331, 482, 551, 263, **383**, 362, 284
3 x 1 = 3
4 x 2 = 8
5 x 1 = 5
2 x 3 = 6
3 x 3 = 9
3 x 2 = 6
2 x 4 = 8

81. 2
81. Ant, fly and bee are insects. Similarly, hamster, squirrel and mouse are all rodents.

82. 2
82.



So, West becomes 'South east'.

83. 1
83. $5 + 6 \times 3 - 12 \div 2$
$= 5 + 18 - 6$
$= 17$
So interchange is $\div$ and $\times$.

84. 2
84.

B	O	X	E	R
−1 ↓	+2 ↓	−1 ↓	+2 ↓	−1 ↓
A	Q	W	G	Q

Similarly,

V	I	S	I	T
−1 ↓	+2 ↓	−1 ↓	+2 ↓	−1 ↓
U	K	R	K	S

85. 2
85. x weeks and x days

= 7x + x = 8x

86. 4
86. Silver is the cheapest among gold, silver, ruby and emerald. Silver is called Ruby, so answer is Ruby.

87. 1
87.

R	I	P	P	L	E
↓	↓	↓	↓	↓	↓
6	1	3	3	8	2

L	I	F	E
↓	↓	↓	↓
8	1	9	2

So,

P	I	L	L	E	R
↓	↓	↓	↓	↓	↓
3	1	8	8	2	6

88. 2
88. By observation.

89. 1
89. If C is 8, A is 6, R is 4 then definitely E has to be 2. So 8640 is not possible.

90. 4
90. Monday $\rightarrow$ 1 odd day
61 days $\rightarrow$ 5 odd days
$\therefore$ 1 + 5 = 6 odd days $\rightarrow$ Saturday

91. 4
91. Q is the father of R, who is the brother of T, who is the daughter of M. so, M is the wife of Q can be represented by Q $ R @ T * M.

92. 1
92. By observation.

93. 2
93. By observation.

94. 4
94. By observation.

95. 1
95. The folds act like a mirror, so figure 1 is formed.

96. 1

96.

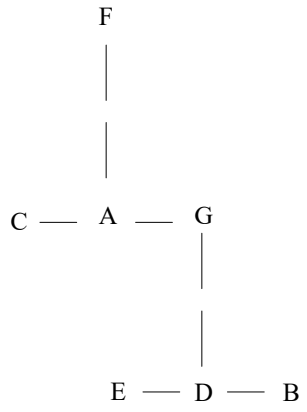
$3 + 9 = 31$ $\left\{\begin{array}{l} 3 \div 3 = 1 \\ 9 \div 3 = 3 \end{array}\right)$

$15+27=95$ $\left\{\begin{array}{l} 15 \div 3 = 5 \\ 27 \div 3 = 9 \end{array}\right)$

Similarly $12+27=94$ $\left\{\begin{array}{l} 27 \div 3 = 9 \\ 12 \div 3 = 4 \end{array}\right)$

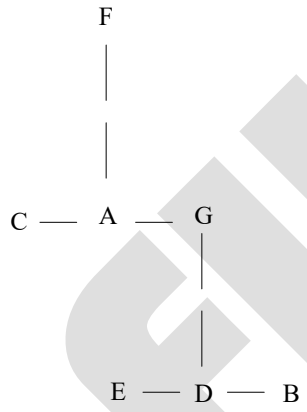
97. 3

97.



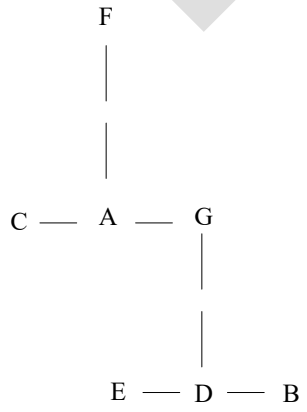
98. 3

98.



99. 3

99.



100. 1

100. The 10 triangles are a, b, c, e, f, bde, cdf, eda, fdb, adc.

NTSE STAGE – I (HARYANA STATE)
(For Class – X)
SET - C
SCHOLASTIC APTITUDE TEST (SAT)
HINTS & SOLUTIONS

1. 3
Sol. The difference between systolic and diastolic blood pressure is known as pulse pressure.

2. 4
Sol. About 1% of living species are in danger of extinction.

3. 3
Sol. Entry of water into root hairs takes place through osmosis.

4. 4
Sol. Tendons & ligaments are type of connective tissue (fibrous).

5. 1
Sol. The spider use Spinnerates to prepare web.

6. 3
Sol. Variations are the source of Evolution.

7. 3
Sol. Mode of nutrition in cuscuta is parasitic.

8. 1
Sol. Nephron is structural and functional unit of kidney.

9. 2
Sol. Lateral ventricles are found in Cerebral hemisphere.

10. 4
Sol. Cessation of menstrual cycle is called Menopause.

11. 4
Sol. Alveoli is the site for exchange of gases in human.

12. 3
Sol. Jaundice (viral infection) is caused due to external factors.

13. 1
Sol. High yielding varieties of what were initially developed by an Indian scientist by cross breeding the traditional varieties with Mexican varieties.

14. 2
Sol. ILS–82 and B–77 are breeds of fowl.

15. 4
Sol. 25 g H_2O
$= \frac{25}{18}$ mole H_2O

= 1.38 mole H_2O

$= 1.38 \times 6.023 \times 10^{23}$ atoms of oxygen

$= 8.31174 \times 10^{23}$ O atom

$= 8.31174 \times 2 \times 10^{23}$ H atom

$= 16.6234 \times 10^{23}$ H atom

16. 1

Sol Formula of Blue Vitriol is $CuSO_4 \cdot 5H_2O$

17. 2

Sol. Approximate pH of digestive fluid in stomach is 2 (Fact based)

18. 1

Sol. $CO + 2H_2 \xrightarrow[450^\circ]{ZnO+Cr_2O_3 \text{ Catalyst}} CH_3OH$

19. 3

The oxidation state of compounds are:

$CrO_2^- = +3$ $\quad$ $CrO_4^{2-} = +6$

$ClO_3^- = +5$ $\quad$ $MnO_4^- = +7$

20. 2

Sol. The oxide ore is zincite (ZnO)

21. 3

Sol. The wrong statements are: Ni placed before Co in Mandleev's Periodic table and Eka-silicon in Mandleev's periodic table is gallium.

22. 4

Sol. Magnesium do not impart colour and its ionization enthalpy is high due to small size.

23. 2

Sol. Ionisation energy of halogen is very high. (Fact based)

24. 3

Sol. Sodium hydrogen carbonate test is given by Ethanoic acid not by Ethanol

$C_2H_5OH + NaHCO_3 \longrightarrow$ No reaction

$CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + CO_2 \uparrow + H_2O$

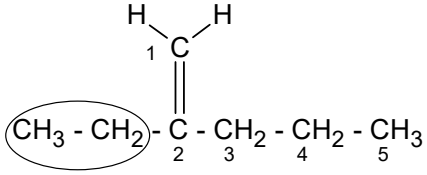
25. 3

Sol. The only possible reaction is

$Mg + CuSO_4(aq) \longrightarrow MgSO_4(aq) + Cu \downarrow$

26. 4

Sol. The correct IUPAC name of compound is :



2-Ethyl-1-pentene

27. 4

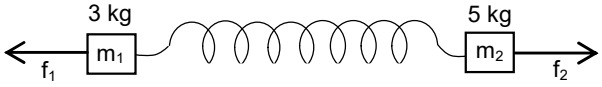
Sol. The balance chemical reaction is:

$$3Cu + \underset{(dil)}{8HNO_3} \longrightarrow 3Cu(NO_3)_2 + 4H_2O + 2NO$$

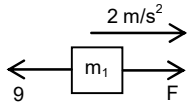
So, a = 3
b = 8
c = 3
d = 4
e = 2

28. 2

Sol.



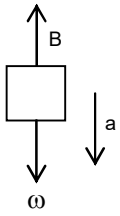
$$a = \frac{\delta_2 - \delta_1}{m_1 + m_2} = \frac{16}{8} = 2\ m/s^2$$



$F - 9 = 3 \times 2$
$F = 15\ N$

29. 3

Sol.



$\omega - B = ma$

$\omega - B = \frac{\omega}{g}a \quad \left[m = \frac{\omega}{g}\right]$

$\Rightarrow \quad B = \omega - \frac{\omega_a}{g}$

$\Rightarrow \quad B = \omega\left(1 - \frac{a}{g}\right)$

30. 4

Sol. Velocity is the slope between s – t curve.

$\therefore$ Velocity = $\tan\theta$

$= \tan 30° = \frac{1}{\sqrt{3}}$.

31. 3

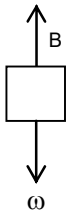
Sol. This motion is uniform accelerated motion and initial velocity of particle is not zero.

32. 4

Sol. Velocity of sound wave in a medium does not depend on frequency. So velocity will remain same.

33. 2

Sol.



Let the volume be V.
Density of liquid = ρ
Density of block = $\rho/3$.

$\omega = \frac{V\rho}{3} \times g$; $B = V\rho g$

$\therefore$ Acceleration = $\frac{B - \omega}{m} = \frac{V\rho g - \frac{V\rho}{3}g}{\frac{V\rho}{3}} = 2g$

34. 1

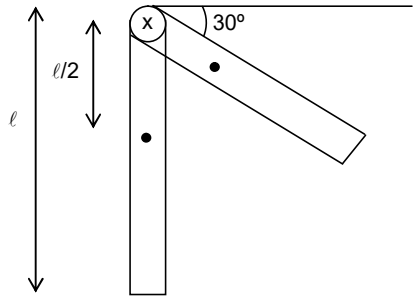
Sol. Let the distance travelled by boy = x.

$$Mx = \frac{M}{5}(L - x)$$

$$\Rightarrow\ 5x = L - x \quad ; \quad \Rightarrow \quad x = \frac{L}{6}$$

35. 4

Sol.



Centre of mass is raised by a height of $\ell/4$.

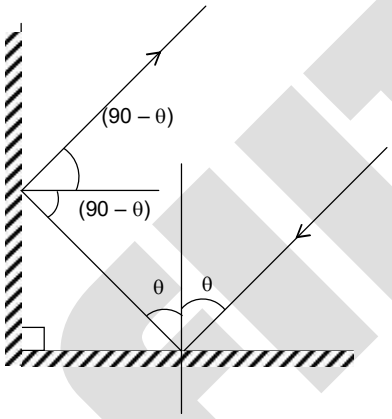
Work done = $\frac{mg\ell}{4}$

36. 3

Sol. Resistance of series combination is more than each resistance.
Resistance of parallel combination is less than each resistance–
So, x_1 = series
x_4 = parallel
x_2, x_3 = individual resistance

37. 4

Sol.



From the ray diagram angle between the mirrors is $90°$.

38. 3

Sol. $B = \frac{\mu_o I}{2r}$, so option 3 is right.

39. 1

Sol. $\frac{1}{V} - \frac{1}{u} = \frac{1}{f} \quad \Rightarrow \quad \frac{u}{V} - 1 = \frac{u}{f}$

$$\Rightarrow \frac{1}{m}-1=\frac{u}{f}\left[\text{as } m=\frac{V}{u}\right]$$

$$y=\frac{x}{f}+1\left[\begin{matrix}y=\frac{1}{m}\\ x=u\end{matrix}\right]$$

$$\frac{1}{f}=\frac{b}{c}$$

$$f=\frac{c}{b}$$

$$\therefore \text{Power}=\frac{1}{f}=\frac{b}{c}$$

40. 4

Sol. Reading will be zero as no current will flow through A_2 and 10Ω resistance in parallel to A_1.

81. 1

Sol. Let BC = x then $AB=\frac{x}{\sqrt{3}}$ and $AC=\frac{2x}{\sqrt{3}}$

BD : DC = AB : AC = 1 : 2

82. 3

Sol. $a+b=-5,\ ab=d,\ a+c=-6,\ ac=2d$

$\frac{ab}{ac}=\frac{d}{2d}\Rightarrow\frac{b}{c}=\frac{1}{2}$ and $(a+b)-(a+c)=-5+6$

$\Rightarrow b-c=1$

Let b = k, c = 2k then $b-c=1\Rightarrow k=-1$

$\Rightarrow b=-1,\ a=-4$

$\Rightarrow d=4$

83. 2

Sol. Each edge $=\frac{x}{12}$ metres

According to the question $6\times\left(\frac{x}{12}\right)^2=x\Rightarrow x=24$

$\Rightarrow$ each edge = 2 metres

Volume = 8 m^3

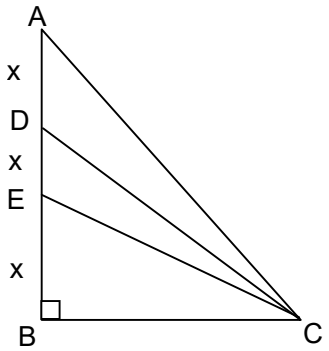
84. 4

Sol. In given figure

$AC^2-EC^2=\left(9x^2+BC^2\right)-\left(BC^2+x^2\right)$

$=8x^2$ and $DC^2-BC^2=4x^2$

$\Rightarrow\frac{AC^2-EC^2}{DC^2-BC^2}=2$



85. 1

Sol. 15^{th} term of these AP's will form an AP in which first term = 15, common difference = 14

So, $S_{15} = \frac{15}{2}[30 + 196] = 1695$

86. 3

Sol. Since ABC is right angled triangle

$\Rightarrow DA = DB = \frac{1}{2} \times 26 = 13$ cm

87. 3

Sol. $\frac{14588}{8750} = \frac{1042}{5^4}$ which will terminate after 4 decimal places.

88. 2

Sol. Let roots of $x^3 + 2x^2 + a$ are α, β and γ and roots of $x^5 - x^4 - 4x^3 + 3x^2 + 3x + b$ are $\alpha, \beta, \gamma, \delta$ and ψ then $\alpha + \beta + \gamma = -2,\ \alpha\beta + \beta\gamma + \gamma\alpha = 0, \alpha\beta\gamma = -a$

Also $\alpha + \beta + \gamma + \delta + \psi = 1 \Rightarrow \delta + \psi = 3$

$\Rightarrow \alpha\beta\gamma\delta + \beta\gamma\delta\psi + \gamma\delta\psi\alpha + \delta\psi\alpha\beta + \psi\alpha\beta\gamma = 3$

$\Rightarrow -a\delta + \delta\psi(\beta\gamma + \gamma\alpha + \alpha\beta) - a\psi = 3$

$\Rightarrow -a(\delta + \psi) = 3$

$\Rightarrow a = -1$

$\Rightarrow x^3 + 2x^2 + a$ reduces to $x^3 + 2x^2 - 1$ and $x = -1$ is root of $x^3 + 2x^2 - 1$

$\Rightarrow b = -2$

89. 3

Sol. Let present age of son = x years

Present age of father = 6x years

According to the question

$6x + 4 = 4(x + 4)$

$x = 6$

$\Rightarrow$ father's age = 36 years

Son's age = 6 years

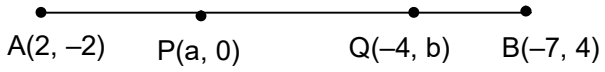
90. 4

Sol. Number = HCF (72 –7, 127 – 10) = 13

91. 2

Sol. $\frac{2-4}{2} = a \Rightarrow a = -1$

$\frac{0+4}{2} = b \Rightarrow b = 2$



92. 4

Sol. $\frac{\cos\theta - \sin\theta + 1}{\cos + \sin\theta - 1}$

$= \frac{\cot\theta - 1 + \operatorname{cosec}\theta}{\cot\theta + 1 - \operatorname{cosec}\theta}$

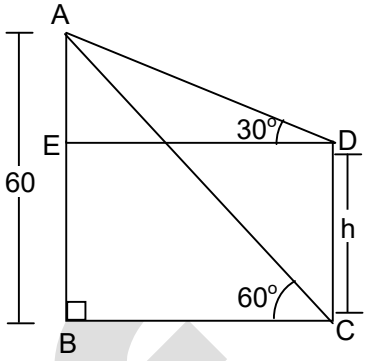
$= \frac{\cot\theta + \operatorname{cosec}\theta + \cot^2\theta - \operatorname{cosec}^2\theta}{\cot\theta - \operatorname{cosec}\theta + 1}$

$$= \frac{(\cot\theta + \operatorname{cosec}\theta)(1 + \cot\theta - \operatorname{cosec}\theta)}{(\cot\theta - \operatorname{cosec}\theta + 1)}$$

$$= \cot\theta + \operatorname{cosec}\theta$$

93. 3

Sol. Let AB is Tower, DC is pillar



In ΔABC, $\frac{60}{BC} = \tan 60 = \sqrt{3}$

$\Rightarrow BC = 20\sqrt{3}$

In ΔAED, $\frac{60 - h}{20\sqrt{3}} = \tan 30 = \frac{1}{\sqrt{3}} \Rightarrow h = 40\,m$

94. 2

Sol. Since angle between diagonals is 90°

$\Rightarrow$ angle between sides of quadrilateral (which is formed by joining midpoints) is also 90°

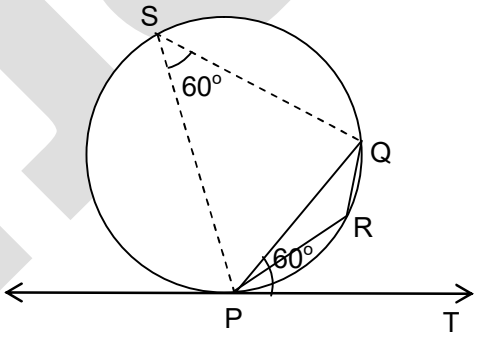
$\Rightarrow$ Quadrilateral formed will be rectangle

95. 3

Sol. In the given figure

$\angle PSQ = \angle QPT = 60°$

$\Rightarrow \angle QRP = 120°$



96. 2

Sol. Area (PBCQ) $= \frac{1}{2} \times 10 \times 10 - \frac{90}{360} \times \frac{22}{7} \times 7 \times 7$

= 11.5 cm^2

97. 4

Sol. $\frac{1}{3} \times \frac{22}{7} \times h\left(28^2 + 21^2 + 28 \times 21\right) = 28490$

$\Rightarrow h = 15$ cm

$\ell = \sqrt{15^2 + (28 - 21)^2} = \sqrt{274}$ cm

98. 1

Sol. Favourable outcomes

$= \{(6,1),(1,6),(2,5),(5,2),(4,3),(3,4),(6,2),(2,6),(5,3),(3,5),(4,4)\}$

Probability $= \frac{11}{36}$

99. 3

Sol. Let speed of stream = x km/hr

Then according to the question $\frac{12}{10+x}+\frac{12}{10-x}=\frac{5}{2}\Rightarrow x=2$

100. 2

Sol. $y+20+50=180\Rightarrow y=110$ and $2x+y=180\Rightarrow x=35$