FIITJEE
LIMITED

ALL INDIA OPEN TEST SERIES

for

TARGET NTSE-2017-18

PART TEST – 3

(4th September 2017)

MAT, ENGLISH & SAT

(OBJECTIVE)

Please handover this booklet only after the examination is over.

ANSWERS & SOLUTIONS

FIITJEE

TARGET NTSE-2017-18

ALL INDIA OPEN TEST SERIES

921 FIITJEE students qualified in (2016-17) for NTSE Stage II

ANSWERS, HINTS & SOLUTIONS

PART TEST – 3

MAT

(Paper – 1)

CODE : 1007

Q. No.	ANSWERS	Q. No.	ANSWERS
1.	**C**	30.	**C**
2.	**D**	31.	**A**
3.	**A**	32.	**A**
4.	**D**	33.	**A**
5.	**B**	34.	**B**
6.	**D**	35.	**D**
7.	**A**	36.	**C**
8.	**C**	37.	**B**
9.	**D**	38.	**D**
10.	**C**	39.	**C**
11.	**D**	40.	**A**
12.	**D**	41.	**A**
13.	**D**	42.	**C**
14.	**A**	43.	**A**
15.	**B**	44.	**C**
16.	**B**	45.	**D**
17.	**C**	46.	**C**
18.	**A**	47.	**C**
19.	**C**	48.	**D**
20.	**C**	49.	**B**
21.	**D**	50.	**C**
22.	**A**		
23.	**B**		
24.	**A**		
25.	**B**		
26.	**C**		
27.	**A**		
28.	**D**		
29.	**A**		

HINTS & SOLUTIONS

1. C

In 1 kg of fresh watermelon,

Solid Part	Water Part
10%	90%
2 kg	18 kg

When watermelon dries, theoretically, solid part remains constant, and only water part gets dried.
In dried watermelon,

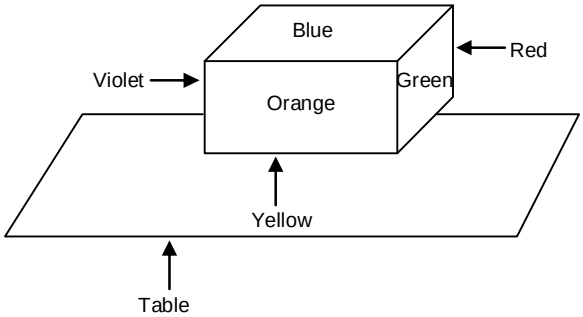
Solid Part	Water Part
80%	20%

2 kg (This will remain fixed vis a vis Fresh watermelon)

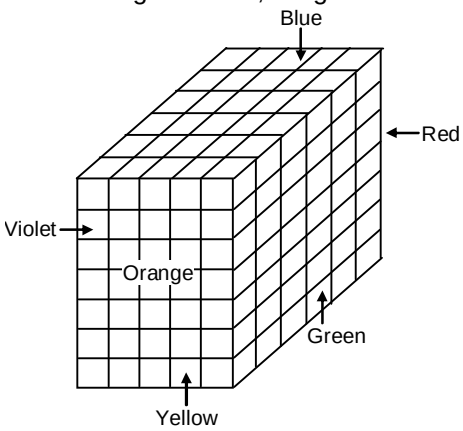
Since 80% of dried watermelon = 2 kg, hence, 100% of dried watermelon = $\frac{100}{80} \times 2 = 2.5$ kg

Direction: (Solution for Q. 2 to 3): From the data, we get the following diagram:

2. D



$210 = 5 \times 6 \times 7$ which means that 4 cuts are made in one direction 5 in the other and 6 in the third direction. We know that the maximum cuts are made in the horizontal direction i.e. 6 cuts. The minimum cuts (i.e. 4) are made parallel to the Violet face. 5 cuts are made in the third direction. After cutting the cube, we get the following diagram.



Number of pieces having none of the faces painted is actually the core of the structure.
Core of the structure = $3 \times 4 \times 5 = 60$ pieces.
Number of pieces with exactly one face painted is counted per individual face of the cube.
Orange face = 15 pieces = Red face.
Green face = 20 pieces = Violet face.
Blue face = 12 pieces = Yellow face.
$\therefore$ Number of pieces with one face painted
$= 15 \times 2 + 20 \times 2 + 12 \times 2 = 94$
$\therefore$ Number of pieces with at most one face painted is $60 + 94 = 154$.

3. A
None of the surfaces painted = 60
3 surfaces painted = 8
2 surfaces painted = Total pieces – {3 surfaces painted + 1 surface painted + 0 surface painted}
$\therefore$ 2 surface painted = 210 – {8 + 94 + 60}
2 surfaces painted = 48
$\therefore$ At least two surfaces painted or no surface painted = 48 + 8 + 60 = 116.

4. D
3 appears in each of the above figure from figure (i), (ii) & (iii) it is clear that 4, 2, 5 and 1 appear adjacent to 3 and 6 appears opposite 3. Now, from figure (i) & (ii), it is clear that 3, 2 & 5 appears adjacent to 4. Also 6 appears adjacent to 4. Obviously 1 appears opposite to 4.

5. B
Total scored by Raghu in 12 tests = 600.
It is given that he scored less than or equal to 40 in 4 tests and he did not scored more than 60 in any test. For minimum number of tests with more than 50, we maximize the score of rest of the tests, i.e., he scored 40 in 4 tests, which is equal to 160. in remaining 8 tests, he scored 600 – 160 = 440 marks. Now, out of remaining 8 tests, he must have scored more than 50 in at least 4 tests [(4 × 60 = 240 marks; he can scored equal to 60, more than 60 is not possible.) + (4 × 50 = 200 marks)] = 440 marks. If he scores more than 50 in three tests only, then it will not be possible to get the sum of 440 marks in 8 tests.

6. D
Spends 40% i.e. left with 60%. He was left with 500 + 400 i.e. = 900.
900 is 60% of which number = $900 \times \frac{100}{60} = 1500$.

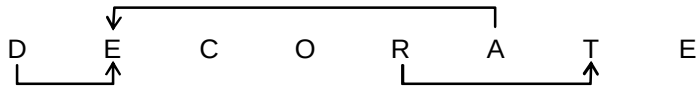
7. A
The difference of 3% is equal to Rs. 240. So, the cost price is $= \frac{240}{3} \times 100 = 8000.$

8. C
When cost price and selling price are reduced by the same amount (say A) then
Cost price = $\frac{[\text{Initial profit \% + Increase in profit \%}] \times A}{\text{Increase in profit \%}}$
In this case, Cost price = $\text{Rs.}\frac{(20+4)\times 100}{4} = \text{Rs.}600$

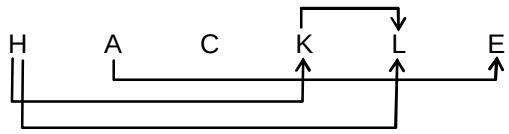
9. D
A : D = $\frac{2}{3} \times \frac{3}{4} \times \frac{16}{15} = \frac{8}{15} = 8:15.$

10. C
Let the numbers are A and B.
Mid proportion of A and B = $\sqrt{AB} = 108$ …(i)
Third proportion of A and B = $\frac{B^2}{A} = 256$ …(ii)
From above two equation,
A = 81, B = 144
A + B = 81 + 144 = $\boxed{225}$

11. D



12. D



13. D
Words after rearrangement:
MET DAT ZOU SOW BIM

14. A
Words after rearrangement:
MDU DZU ZNV SNX ZHN
So none of the words above is meaningful.

15. B
Time from 12 p.m. on Monday to 2 p.m. on the following Monday = 7 days 2 hours = 170 hours.
$\therefore$ The watch gains $\left(2+4\frac{4}{5}\right)$min. or $\frac{34}{5}$min. in 170 hrs.

Now, $\frac{34}{5}$ min. are gained in 170 hrs.

$\therefore$ 2 min. are gained in $\left(170\times\frac{5}{34}\times 2\right)$ hrs = 50 hrs

$\therefore$ Watch is correct 2 days 2 hrs. After 12 p.m. on Monday *i.e.,* it will be correct at 2 p.m. on Wednesday.

16. B
Cube with no red paint at all = 216 – 72 = 144.

17. C
Cube with at least two different colours on their faces = 2 different colours + 3 different colours = 48 + 8 = 56.

18. A
The number of cubes without any face painted = $(6-2)^3 = 64$.

19. C
Third is a part of the first which, in turn, is a part of the second.

20. C
Total no. of hours = 24 × 3 + 6 = 78 hours
$\therefore$ It is 15 min fast but at last it loose 25 min so in total it loose = 15 + 25 = 40 min.
In 78 hours it loose 40 min.
40 min = 78 hours
$\therefore$ So, it loose 1 min = $\frac{78}{40}$hrs.
But for correct time it must loose 15 min only as in starting day it was 15 minutes fast.

$\therefore \frac{78}{40} \times 15 = 29$ hours 15 min

So, the correct time = 2.15 pm on 4th December.

21. D

$24 = 2 + 4 = 6^2 = 36$

$280 = 2 + 8 + 0 = 10^2 = \boxed{100}$

22. A

$85 : 40 \Rightarrow 8 \times 5 = 40$

Similarly, $77 \Rightarrow 7 \times 7 = \boxed{49}$

23. B

$28 + (8 \times 2) = 44$

$28 + 16 = 44$

$35 + (5 \times 3) = 50$

$35 + 15 = \boxed{50}$

24. A

$(7 + 4) \times (7 - 4)$

$11 \times 3 = 33$

$(5 + 2) \times (5 - 2)$

$7 \times 3 = \boxed{21}$

25. B

K is to the immediate left of L. Three places to the right of K is N. M is to the immediate left of N, and L is to the immediate left M. Four places to the right of L is P.

26. C

Clearly, the letters at 5th, 10th, 15th, 20th and 25th places in English alphabet shall be replaced by symbols and those at 7th, 14th and 21st positions by digits. Thus, in all, 8 letters are replaced.

$\therefore$ Number of letters left = (26 – 8) = 18.

27. A

There are four such adjacent pairs of boys whose numbers totals 12.

KL, MN, NO and XY.

28. D

There are five such boys bearing odd numbers and having number 7 on either side i.e., L, O, S, T and U.

29. A

Only boy B bears even numbers and has boys with even numbers on both sides.

30. C

F, J, R and V bear even numbers and have boys with odd numbers on both sides.

31. A

Letter I is exactly in the middle between 9 (9th from the left) and Z (7th from the right end).

32. A

First letter of each group is the next letter / number of last letter / number of preceding group and within each group there is a gap of one letter among the letters / numbers. hence, next group of letters / numbers will be ZQW.

33. A

In 400 gm of alloy, Zinc = $\frac{5}{8}\times 400 = 250$ gm

Copper = $\frac{3}{8}\times 400 = 150$ gm

If x gm of copper be mixed, then $\frac{250}{150+x} = \frac{5}{4}$

$\Rightarrow$ 750 + 5x = 1000

$\Rightarrow$ 5x = 1000 – 750 = 250

$\Rightarrow$ x = 50 gm

34. B

Original price of article = Rs. x / kg

New price = Rs. $\frac{9x}{10}$ / kg.

$\therefore \frac{225}{\frac{9x}{10}} - \frac{225}{x} = 25$

$\Rightarrow \frac{225\times 10}{9x} - \frac{225}{x} = 25 \quad \Rightarrow \frac{2250-2025}{9x} = 25$

$\Rightarrow \frac{225}{9x} = 25 \Rightarrow x = $ Re 1/ kg.

35. D

In 10 litres of first type of liquid,

Water = $\frac{1}{5}\times 10 = 2$ litres

In 4 litres of second type of liquid,

Water = $4\times\frac{35}{100} = \frac{7}{5}$litres

Total amount of water = $2+\frac{7}{5} = \frac{17}{5}$litres

Required percentage = $\frac{\frac{17}{5}}{14}\times 100$

= $\frac{170}{7} = 24\frac{2}{7}\%$

36. C

Initially, A's capital = Rs. x.

B's capital = Rs. $\frac{3x}{2}$

Ratio of the equivalent capitals of A and B for 1 month

$= \left(x\times 10+\frac{3x}{4}\times 2\right):\left(\frac{3x}{2}\times 8+\frac{3x}{4}\times 4\right)$

$= \left(10x+\frac{3x}{2}\right):(12x+3x) = 23:30$

A's share = $\frac{23}{53}\times 53000$ = Rs. 23000

37. B

$CP_1 + CP_2 = 600$

110% CP_1 = 90% of CP_2

$CP_1 = CP_2 = 11 : 9$

$CP_1 = 330$, $CP_2 = 270$

38. D

First part = Rs. x and second part = Rs. y.

$\therefore \frac{x \times 80}{100} = \frac{y \times 60}{100} + 3$

$\Rightarrow \frac{4x}{5} = \frac{3y}{5} + 3$

$\Rightarrow 4x - 3y = 15$ …(i)

Again,

$\frac{4y}{5} = \frac{9x}{10} + 6$

$\Rightarrow 8y = 9x + 60$

$\Rightarrow 8y - 9x = 60$ …(ii)

By equation (i) × 8 + (ii) × 3,

$32x - 24y = 120$

$\underline{24y - 27x = 180}$

$5x = 300 \Rightarrow x = 60$

From equation (i)

$4 \times 60 - 3y = 15$

$\Rightarrow 3y = 240 - 15 = 225$

$\Rightarrow y = \frac{225}{3} = 75$

$\therefore x + y = 60 + 75 = 135$

39. C

Original price of wheat = Rs. x / kg

New price = Rs. $\frac{9x}{10}$ / kg

$\therefore \frac{1}{\frac{9x}{10}} - \frac{1}{x} = \frac{50}{1000} = \frac{1}{20}$

$\therefore \frac{10}{9x} - \frac{1}{x} = \frac{1}{20}$

$\Rightarrow \frac{1}{9x} = \frac{1}{20}$

$\Rightarrow 9x = 20$

$\Rightarrow x = \frac{20}{9}$

$\therefore$ Original price = Rs. $\frac{20}{9}$ / kg

$\because$ Rs. $\frac{20}{9} = 1000$ gm

$\therefore$ Re. 1 = $\frac{1000 \times 9}{20} = 450$ gm

40. A

C.P. of article = Rs. x

$\therefore$ S.P. = Rs. $\frac{112x}{100}$

New C.P. = Rs. $\frac{9x}{10}$

S.P. = $\frac{9x}{10}\times\frac{130}{100}=\text{Rs.}\frac{117x}{100}$

$\therefore$ $\frac{117x}{100}-\frac{112x}{100}=5.75$

$\Rightarrow$ $\frac{5x}{100}=5.75$

$\Rightarrow$ $x=\frac{5.75\times100}{5}=\text{Rs. }115$

$\therefore$ Required S.P. = $\frac{115\times120}{100}=\text{Rs. }138$

41. A

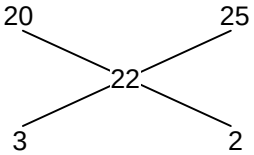
A sales tax of 7% on a price of 2568 would amount to a tax amount o 179.76. Since, the price is rounded off to the next higher integer, the tax would be rounded off to Rs. 180. This would also be the amount of discount (or reduction in price) that Reena is asking for.

42. C

Let the initial times allotted be: 50, 40 and 20 hours.
Then, the time used in each activity is: 20, 12 and 4 hours.
Thus, 36 hours out of 110 are used in all.
Hence, the answer is 36 / 110 = 32.72%

43. A

The S.P. of Desi Chai = Rs. 18
The S.P. of Videshi Chai = Rs. 30
The C.P. of Desi Chai = Rs. 20
The C.P. of Videshi Chai = Rs. 25
The S.P. of mixture = Rs. 27.5
The C.P. of mixture = Rs. 22



Therefore, the ratio of Desi Chai is to Videshi Chai is 3 : 2.

44. C

I N T E R P R E T A T I O N
1st letter $\rightarrow$ I
4th letter $\rightarrow$ E
7th letter $\rightarrow$ R
9th letter $\rightarrow$ T
Words are “TIRE” and “RITE”

45. D

Form I. Possible dates are 15th to 21st November.
Form II. Possible dates are 20th to 27th November.

From I and II. Possible dates are 20^{th} and 21^{st} November.
Thus even after combining I and II, we can't find exact date. So, both I and II are not sufficient.

46. C
From I. home for all $\rightarrow$ 9 2 1
From II. You go home $\rightarrow$ 7 3 2
home $\rightarrow$ 2
By combining both I and II, we can find out that the code for 'home' is 2.

47. C
From I. 'lovely winter season' $\rightarrow$ tic dic nic
From II. 'coolest season of the century' $\rightarrow$ ye zo dic chi mo.
Combining I and II. season $\rightarrow$ dic
Therefore, both I and II together are necessary.

48. D
From I. M is the husband of T's only sister and the gender of T is unknown. Nothing is mentioned about W.
From II. M is maternal grandfather of W. Nothing is mentioned about T.
From I and II. Even by combining both I and II, the gender of T and W does not become clear. So, we can't find exact relationship between them.

49. B
Time from 7 a.m. to 4.15 p.m. = 9 hrs 15 min. = $\frac{37}{4}$ hrs.
3 min. 5 sec. of this clock = 3 min. of the correct clock.
$\Rightarrow \frac{37}{720}$ hrs of this clock = $\frac{1}{20}$ hrs of the correct clock.
$\Rightarrow \frac{37}{4}$ hrs of this clock = $\left(\frac{1}{20}\times\frac{720}{37}\times\frac{37}{4}\right)$ hrs of the correct clock.
= 9 hrs of the correct clock.
$\therefore$ The correct time is 9 hrs after 7 a.m. i.e., 4 p.m.

50. C

Clock A	Clock B
Gain 1 min in 1 hr So, interval = 1 min in 1 hr 60 hrs = 1 hr 12 hrs = $60 \times \frac{12}{24} = 30$ days $\therefore$ After 30 days clock A show the correct time.	Loose 2 min in 1 hr So, interval = 2 min in 1 hr 30 hrs = 1 hr 12 hrs = $30 \times \frac{12}{24} = 15$ days $\therefore$ After 10 days clock B shows the correct.

So, that both clock show the correct time after 30 days. (LCM of 30 and 15)

FIITJEE

TARGET NTSE-2017-18

ALL INDIA OPEN TEST SERIES

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ANSWERS

PART TEST – 3
ENGLISH LANGUAGE TEST
(Paper – 2)

CODE : 1008

Q. No.	ANSWERS	Q. No.	ANSWERS
1.	**C**	30.	**D**
2.	**C**	31.	**A**
3.	**C**	32.	**A**
4.	**A**	33.	**D**
5.	**D**	34.	**A**
6.	**B**	35.	**A**
7.	**D**	36.	**D**
8.	**B**	37.	**B**
9.	**C**	38.	**B**
10.	**C**	39.	**C**
11.	**C**	40.	**C**
12.	**B**	41.	**A**
13.	**D**	42.	**B**
14.	**C**	43.	**A**
15.	**D**	44.	**B**
16.	**A**	45.	**B**
17.	**B**	46.	**C**
18.	**D**	47.	**A**
19.	**D**	48.	**A**
20.	**B**	49.	**C**
21.	**B**	50.	**A**
22.	**B**		
23.	**C**		
24.	**B**		
25.	**A**		
26.	**B**		
27.	**A**		
28.	**C**		
29.	**C**		

FIITJEE **TARGET NTSE-2017-18**

ALL INDIA OPEN TEST SERIES

921 FIITJEE students qualified in (2016-17) for NTSE Stage II

ANSWERS, HINTS & SOLUTIONS
PART TEST – 3
SAT
(Paper – 3)
CODE : 1009

Q. No.	ANSWERS	Q. No.	ANSWERS	Q. No.	ANSWERS	Q. No.	ANSWERS
1.	**C**	31.	**B**	61.	**A**	91.	**C**
2.	**C**	32.	**C**	62.	**D**	92.	**A**
3.	**A**	33.	**A**	63.	**C**	93.	**D**
4.	**C**	34.	**C**	64.	**C**	94.	**D**
5.	**C**	35.	**C**	65.	**A**	95.	**D**
6.	**C**	36.	**C**	66.	**A**	96.	**C**
7.	**C**	37.	**D**	67.	**A**	97.	**C**
8.	**D**	38.	**C**	68.	**A**	98.	**B**
9.	**B**	39.	**D**	69.	**C**	99.	**C**
10.	**D**	40.	**C**	70.	**A**	100.	**A**
11.	**C**	41.	**D**	71.	**D**		
12.	**B**	42.	**B**	72.	**D**		
13.	**C**	43.	**C**	73.	**D**		
14.	**A**	44.	**B**	74.	**A**		
15.	**B**	45.	**D**	75.	**D**		
16.	**B**	46.	**C**	76.	**C**		
17.	**A**	47.	**C**	77.	**A**		
18.	**C**	48.	**B**	78.	**C**		
19.	**C**	49.	**A**	79.	**A**		
20.	**C**	50.	**B**	80.	**C**		
21.	**C**	51.	**B**	81.	**A**		
22.	**D**	52.	**A**	82.	**D**		
23.	**B**	53.	**B**	83.	**A**		
24.	**C**	54.	**D**	84.	**D**		
25.	**D**	55.	**A**	85.	**C**		
26.	**C**	56.	**D**	86.	**B**		
27.	**D**	57.	**A**	87.	**A**		
28.	**C**	58.	**A**	88.	**D**		
29.	**D**	59.	**D**	89.	**B**		
30.	**C**	60.	**D**	90.	**D**		

HINTS & SOLUTIONS

1. $\Delta k = k_f - k_i$

$= \frac{1}{2}15(3.2)^2 - (7.5)^2$

$= -345$ J.

2. $f = -20$ cm. $m = 2$

As $m = \frac{-v}{-u}$

$\therefore \quad 2 = \frac{v}{u}$

or $v = 2u$

As $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

$\therefore \quad \frac{1}{u} + \frac{1}{2u} = \frac{1}{f}$

or $\frac{3}{2u} = \frac{1}{-20}$

$u = -30$ cm.

3. Total efficiency $= 88\% \times 42\% = 37\%$

Useful power = 5.5 kW × 37%

= 2.03 kW

= 2×10^3 W

$P = \frac{W}{t} = \frac{Fd}{t} = F\left(\frac{d}{t}\right)$

$P = F.V$

$V = \frac{P}{F} = \frac{2\times10^3}{410\times9.8}$

= 0.50 m/s.

4. $u_e = -1$ inch, $m = 5$

As $m = \frac{-v}{-u_e}$

$\therefore \quad 5 = \frac{v}{-1};$

$v = -5$ inch.

From $\frac{1}{f} = \frac{1}{v} - \frac{1}{u_e} = \frac{1}{-5} + \frac{1}{1} = 0.8$

$f = \frac{1}{0.8} = 1.25$ inches.

5. $h = 25(1-\cos\theta) = 0.73$

$v_g = mgh = 7.26 \times 9.8 \times 0.73$

= 52 J.

6. L_1 will converge the parallel ray at its focus. L_2 will render it parallel only when the refracted ray starts from the focus of L_2

$\therefore$ Distance between $L_1 L_2 = F_1 + F_2$.

7. Mass lifted $= 0.550 \times 10^6 \times 0.820$

$= 4.51 \times 10^5$ g

$= 451$ kg

Work done = $F_g d = mgh$

$= 451 \times 9.8 \times 25$

$= 1.10 \times 10^5$

$= 1.10 \times 10^5$

$= 1.10 \times 10^2$ kJ

$P = \frac{W}{t} = \frac{1.10 \times 10^2}{35} = 3.14$ kW.

8. Total internal reflection can take place only when light travels from a denser medium to a rarer medium.

9. $P = \frac{W}{t} = \frac{F d \cos\theta}{t}$

$\frac{= 42.3 \times 16 \times \cos 45°}{3}$

$= 1.6 \times 10^2$ W.

10. Rainbow is formed on account of dispersion and total internal reflection.

11. $W = F \times d = m \times g \times d$

$\frac{W}{g \times d} = m$

$\frac{7 \times 10^3}{9.8 \times 1.2} = m$

$\boxed{6 \times 10^2 = m}$.

12. As power of lens used is positive, the person is suffering from long sightedness or hypermetropia.

13. $\mu = \frac{\sin\left(A + \delta_m\right)/2}{\sin A/2}$

$\frac{\sin\left(A + \delta_m\right)}{2} = \mu \sin\frac{A}{2} = \sqrt{2}\sin\frac{60°}{2} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$

$\frac{A + \delta_m}{2} = 45°,\ \delta_m = 90° - A = 90° - 60° = 30°$.

14. Total apparent depth $y = y_1 + y_2 = 5 + 2 = 7$ cm,

If x is real depth = thickness of slab, then as

$\mu = \frac{x}{y},\ x = \mu y = 1.5 \times 7 = 10.5$ cm.

15. Limestone is added as flux.

16. Smelting is the reduction process of an ore using carbon as reducing agent.

17. Aluminum is used because of its reactivity.

18. Froth floatation is used for sulphide ores.

19. Tungsten have maximum tensile strength.

20. Iodine is a solid non-metal with lustre.

21. Cu_2O and Cu_2S react to give copper. It is called auto-reduction.

22. Violet colour rays have the minimum wavelength in VIBGYOR series.

23. Atomic mass is an average mass of its isotopes.

24. Isobars are atoms of two different elements having same atomic mass.

25. An orbital can have maximum of two electrons of opposite spin.

26. As per (n + l) rule, the order of filling will be, 4s < 3d < 4p.

27. The electronic configuration of an atom/ion obeys all the above mentioned principles.

28. According to five kingdom system of classification as proposed by Whittaker, all kingdoms contains eukaryotes except kingdom Monera.

29. High concentration of DDT disturbs calcium metabolism of birds resulting in thinning of egg shells and their premature breaking that kills the embryos.

30. The fusion of nucleus of a male gamete with two polar nuclei is called vegetative fertilization or triple fusion. The product of triple fusion is primary endosperm cell which forms the endosperm.

31. Chordates include Urochordates, Cephalo chordates and vertebrates. Thus, all vertebrates are chordates but all chordates are not vertebrates.

32. The formation and maturation of sperms occurs inside the testis, which require 2-3° lower temperature than that of body. That is why testis are located outside the abdominal cavity inside the scrotum.

33. Ozone layer is present in the stratosphere. It is also called the ozonosphere.

34. Parthenocarpy is the development of fruit from an unfertilized flower so that fruits does not contain seeds.

35. Gymnosperms are vascular plants. However, xylem is without vessels and phloem is without sieve tubes and companion cells.

36. Copper ions released for copper releasing IUDs suppress sperm motility and hence, the fertilising capacity of sperms.

37. Deforestation is large scale cutting down of trees. In absence of trees, water cycle also gets disturbed.

38. The correct sequence of events in the sexual reproduction of a flower are pollination, fertilization embryo and seeding.

39. During childbirth, oxytocin hormones stimulates the contractions in myometrium of uterus that helps in childbirth.

40. (i) Hydra reproduces asexually by budding.
(ii) Grafting is an artificial method of vegetative propagation.
(iii) Spermatogenesis, formation of sperms occurs in the seminiferous tubules.
(iv) Semen is a mixture of sperms and seminal plasma (secretions of seminal vesicles). Prostate glands and cowpers glands.

41. $x^2 + 8x - 16 = 0$

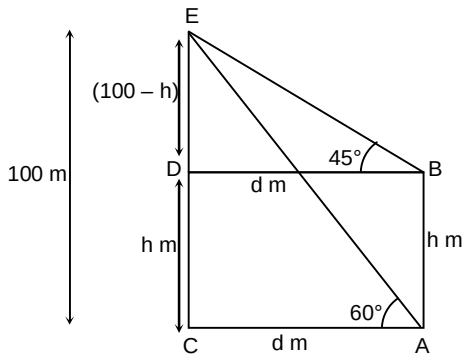
The product of the roots = $\frac{c}{a} = -16$

42. Given that, 6^{th} term $(a_6) = 32$
$\Rightarrow a + 5d = 32$ …(i)
and $a_{12} = 56$
$a + 11d = 56$ …(ii)
Solving equation (i) and (ii), we get
$d = 4, a = 12$
9^{th} term $a_9 = a + 8d = 12 + 4 \times 8 = 44$

43. $\cos 2\theta = \frac{1 - \tan^2\theta}{1 + \tan^2\theta}$
$= \frac{-2\tan^2\theta}{2 + 2\tan^2\theta}$
$= -\sin^2\theta$
$\because \cos 2\theta + \sin^2\theta = 0$

44. $407 = 3 + (n - 1)4 \Rightarrow N = 102$
$\therefore$ 20th term from end $\Rightarrow m = 20$
$a_{102 - (20 + 1)} = a_{102 - 19} = a_{83}$ from beginning
$a_{83} = 3 + (83 - 1)4 = 331$

45. $\tan 45° = \frac{ED}{BD}$
$1 = \frac{100 - h}{d}$
$d = 100 - h$
$\tan 60° = \frac{EC}{CA}$
$\sqrt{3} = \frac{100}{d}$
$\sqrt{3}(100 - h) = 100$
$100\sqrt{3} - \sqrt{3}h = 100$
$100(\sqrt{3} - 1) = \sqrt{3}h$
$h = \frac{100\left(\sqrt{3} - 1\right)}{\sqrt{3}}$ m or $\frac{100\left(3 - \sqrt{3}\right)}{3}$ m



46. area of shaded portion = area of circle – area of rectangle

$= \frac{22}{7} \times 5 \times 5 - 8 \times 6$

$= 30.57 \text{ cm}^2$

47. OE = OB = radius of the circle

$\angle OEB = \angle OBE$ (angles opposite equal sides of an isosceles triangle are equal)

In ΔOEB : $\angle OEB + \angle OBE + \angle BOE = 180°$

$\angle BOE = 180° - 2 \times 70°$

$= 40°$

48. Let α, $\alpha - 1$, be the roots

$\alpha + \alpha - 1 = p$, $\alpha(\alpha - 1) = q$

$\alpha = \frac{p+1}{2}$, $\frac{p+1}{2}\left(\frac{p+1}{2} - 1\right) = q$

$\Rightarrow \frac{(p+1)}{2}\frac{(p-1)}{2} = q$

$\Rightarrow p^2 - 1 = 4q$

$\Rightarrow p^2 - 4q = 1$

49. $$\frac{2\cos\left(\frac{4x+2x}{2}\right)\cos\left(\frac{4x-2x}{2}\right) + \cos 3x}{2\sin\left(\frac{4x+2x}{2}\right)\cos\left(\frac{4x-2x}{2}\right) + \sin 3x}$$

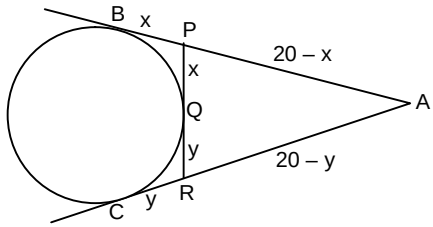
$= \frac{2\cos 3x \cos x + \cos 3x}{2\sin 3x \cos x + \sin 3x}$

$= \frac{\cos 3x}{\sin 3x} = \cot 3x$

50. Perimeter of ΔAPR = AP + PR + AR

= 20 – x + x + y + 20 – y

= 40 units

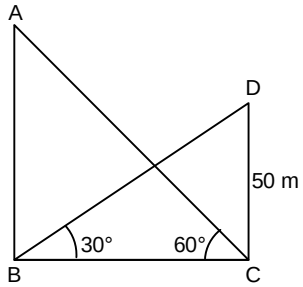


51. $\tan 30° = \frac{DC}{BC}$

$BC = 50\sqrt{3}$

Now $\tan 60° = \frac{AB}{BC}$

$AB = \sqrt{3} \times 50\sqrt{3} = 150$ m



52. $a = 1, d = 3$

$\therefore S_n = \frac{n}{2}\{2a + (n-1)d\}$

$= \frac{20}{2}\{2\times1 + (20-1)\times3\} = 10\times59 = 590.$

53. $\left(1+\frac{\cos\theta}{\sin\theta}-\frac{1}{\sin\theta}\right)\left(1+\frac{\sin\theta}{\cos\theta}+\frac{1}{\cos\theta}\right)$

$= \frac{(\sin\theta+\cos\theta-1)(\sin\theta+\cos\theta+1)}{\sin\theta\cos\theta}$

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

$= \frac{2\sin\theta\cos\theta}{\sin\theta\cos\theta} = 2$

54. OS = OQ

$\angle OSQ = \angle OQS = 50°$

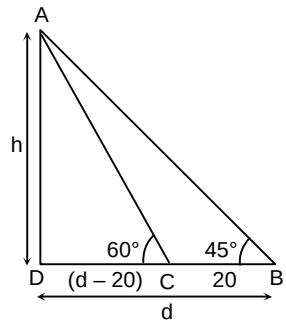
$\therefore \angle SOQ = 80°$

Now, In ΔOSP

$\angle SPR = 180° - (80° + 90°)$

$= 10°$

55. Now $\tan45° = \frac{AD}{BD}$



$1 = \frac{h}{d}$

$h = d$

$\tan60° = \frac{AD}{CD}$

$\sqrt{3} = \frac{h}{d-20}$

$\sqrt{3} = \frac{d}{d-20}$

$\sqrt{3}\,d - 20\sqrt{3} = d$

$\sqrt{3}\,d - d = 20\sqrt{3}$

$d(\sqrt{3} - 1) = 20\sqrt{3}$

$d = \frac{20\sqrt{3}}{\sqrt{3}-1}\times\frac{\sqrt{3}+1}{\sqrt{3}+1}$

$10\sqrt{3}\,(\sqrt{3} + 1)$

$\Rightarrow 10(3 + \sqrt{3})m$

56. Find the roots α and β or write $\alpha^2 + \beta^2$ as $(\alpha + \beta)^2 - 2\alpha\beta$ and $\alpha + \beta$ = sum of roots and $\alpha\beta$ product of roots.

$\Rightarrow (\alpha + \beta)^2 - 2\alpha\beta/(\alpha + \beta) = 144 - 64/12 = 20/3$

57. $\tan\theta - \cot\theta = a$

on squaring

$(\tan\theta - \cot\theta)^2 = a^2$

$\tan^2\theta + \cot^2\theta - 2 = a^2$

$\tan^2\theta + co^2\theta + 2 = a^2 + 4$
$(\because 1 + \tan^2\theta = \sec^2\theta,\ 1 + \cot^2\theta = \text{cosec}^2\theta)$
$\sec^2\theta + \text{cosec}^2\theta = a^2 + 4$
$\Rightarrow \dfrac{1}{\cos^2\theta} + \dfrac{1}{\sin^2\theta}$
$\Rightarrow \dfrac{\sin^2\theta + \cos^2\theta}{\sin^2\theta\cos^2\theta} = \dfrac{1}{\sin^2\theta\cos^2\theta}$
again
$\cos\theta - \sin\theta = b$
$\cos^2\theta + \sin^2\theta - 2\cos\theta\sin\theta = b^2$
$1 - 2\cos\theta\sin\theta = b^2$
$-2\cos\theta\sin\theta = b^2 - 1$
$4\cos^2\theta\sin^2\theta = (b^2 - 1)^2$
now $(a^2 + 4)(b^2 - 1)^2 = \dfrac{4\cos^2\theta\sin^2\theta}{\sin^2\theta\cos^2\theta} = 4$

58. $S_9 = S_{11}$
$\therefore S_{11} - S_9 = 0$
and $a_{11} + a_{10} = 0$
as these are 20 terms in A.P.
$a_1 + a_{20} = a_2 + a_{19} = \ldots\ldots = a_{10} + a_{11} = 0$
thus $a_1 + a_{20} = 0$

59. Use $\alpha + \beta = -b/a$ and $\alpha\beta = c/a$
$\alpha + \beta = \dfrac{-25}{3}$
and $\alpha\beta = \dfrac{-75}{3} = -25$

60. Area of shaded portion = area of circle – area of triangle
$\Rightarrow$ area of circle = $\pi r^2 \Rightarrow \dfrac{22}{7} \times 5 \times 5 = 78.57\ \text{cm}^2$
$\Rightarrow$ area of triangle = $\dfrac{1}{2} r^2 \sin\theta = \dfrac{1}{2} \times 25 \times \sin\theta = 10.8\ \text{cm}^2$
Area of shaded portion = 78.57 – 10.8
= 67.77 cm^2

61. T. E. Turner painted a famous London resort pleasure gardens to provide facilities for sports, entertainment in the year 1923.

62. All are correct.

63. The play Maison Neuve was written in 1866, during the Haussmanisation of Paris.

64. Ermine is a type of fur.

65. Mrs. Amelia Bloomer, an American, was the first dress reformer to launch loose tunics worm over ankle-length trousers.

66. The artificial fibres clothes first came into existence in the early 20th century.

67. A test cricket can go for 5 days and still end in a draw.

68. The first Indian club was established in Calcutta in 1792.

69. South Africa is a racist state which barred non-white from playing that is why South Africa was boycott in Test matches.

70. 'Customary rights' refers to custom and traditions.

71. The main pastoral communities of Africa are Bedouins, Berbers, Boran, Turkans, Maasai and Senate.

72. The climate and associated weather conditions in India are governed by the pressure and surface winds, upper air circulation and western cyclonic disturbances and tropical cyclones.

73. The Coriolis force is responsible for deflecting winds towards the right in the northern hemisphere and towards the left in the southern hemisphere.

74. The presence of the El nino leads to an increase in sea-surface temperatures and weaking of the trade winds in the region.

75. Bangladesh and Japan have higher average population densities than India.
Bangladesh – 1046 person per sq. km.
Japan – 339 person per sq. km. (Japan's area is smaller than India)
India – 382 person per sq. km.

76. According to the NPP 2000, adolescents needs much attention and is a major section of population.

77. % rate of increase in population per annum is the annual growth rate of population.

78. 2/3rd of India's population are involved in agricultural activities.

79. In state like Assam, West Bengal and Odisha the above three crops of paddy are grown in a year.

80. Cotton requires high temperature, light rainfall, 210 frost free days and bright sunshine for its growth.

81. Nickel, cobalt are ferrous minerals. Copper, lead are non-ferrous. Sulphur, limestone comes under non-metallic and coal, petroleum are energy minerals.

82. Durg-Bastar-Chandrapur belt lies in Chhattisgarh and Maharashtra. Very high grade hematites are found here.

83. Since 1950, the blacks, coloured and Indian fought against the Apartheid system.

84. Yes, all the statements about the African Constitution are correct.

85. Baldev Singh born in Haryana was a successful entrepreneur and leader of the Panthic Akali Party in the Punjab Assembly.

86. The Chief Election Commissioner is appointed by the President.

87. (i) Everyone who is 18 years of age or older has a right to vote is Universal Adult Franchise.
(ii) Reservation of seats for the SCs and the STs is the representation of weaker section.
(iii) Anyone can form a party or contest election is open political competition.
(iv) One vote one value relates to each constituency has roughly the same population.

88. Economic equality is not being included in the Right to Equality as given by the Indian constitution.

89. The Haryana state had been ruled by congress party led government since 1982.

90. Right to constitutional remedies is considered as soul of the constitution by Dr. B. R. Ambedkar.

91. NHRC is an independent commission set up by law in 1993.

92. Office memorandum is a communication issued by an appropriate authority stating the policy on decision of the government.

93. The meetings of Rajya Sabha are presided over by Vice-President of India.

94. Interest rate, collateral and documentation together comprise terms of credit.

95. All the elements help in removal of poverty.

96. A self help group usually has 15-20 members. Usually belonging to one neighbourhood, who meet and save regularly.

97. What a person desires to sell is exactly what the other wishes to buy is the condition of double coincidence of wants.

98. Prof. Muhammad Yunus is the founder of Grameen Bank of Bangladesh.

99. SGSY was launched in 1999 aims at bringing poor families above poverty line.

100. PMRY, started in 1993.