PRELIMINARY INTERVIEW BOARD

TERRITORIAL ARMY COMMISSION : 25 SEPTEMBER 2022

PAPER–1: REASONING & ELEMENTARY MATHEMATICS

A1

Max Time : 2 Hours **(Please Read The Instructions Carefully)** **Max Marks : 100**

Roll No……..

INSTRUCTIONS

1. Paper–1 has two parts: Part I & Part II
   (a) Part I : Reasoning (50 marks)
   (b) Part II: Elementary Mathematics (50 marks)
2. Each section carries 50 objectives type of questions.
3. There will be four possible answers to every question. Candidates are required to fill correct answer in the OMR sheet with Black ball pen.
4. For each correct answer, 1 mark will be granted and 0.33 mark will be deducted for every wrong answer.
5. If a candidate gives more than one answer, it will be treated as a wrong answer and 0.33 mark will be deducted. There will be no penalty for questions left unanswered.
6. Candidates should not mark in the question paper. They can use blank pages provided in the question paper for rough work.
7. Paper 2 has part I & Part II. To be eligible to qualify, candidate must obtain minimum 40% marks each in Part I & II separately and a minimum of 50% aggregate in total.
8. This question paper contains 20 number of pages.

PART–1 : REASONING

Direction: In each of the following questions, select the related word from the given alternatives:-

Q1. Giant : Dwarf :: Genius : ?
(a) Wicked (b) Gentle **(c) Idiot** (d) Tiny

Q2. Forecast : Future :: Regret : ?
(a) Present **(b) Past** (c) Atone (d) Sins

Q3. Planet : Orbit :: Projectile : ?
(a) Trace (b) Milky Way **(c) Trajectory** (d) Path

Q4. Pesticide : Crop :: Antiseptic : ?
(a) Clotting (b) Bandage **(c) Wound** (d) Bleeding

Q5. Symphony : Composer :: Antiseptic: ?
(a) Painter (b) Inventor (c) Singer (d) Writer

Direction In each of the following questions, there is a certain relationship between two given numbers on one side of : : and one number is given on another side of the same : : while another number is to be found from the given alternatives;- .

Q6. 42 : 20 : : 64 : ?
(a) 31 (b) 32 (c) 33 (d) 34

Q7. 49 : 81 : : 100 : ?
(a) 64 **(b) 144** (c) 169 (d) None of the above

Q8. 0.16 : 0.0016 : : 1.02 : ?
(a) 0.0102 (b) 0.102 (c) 1.020 (d) 10.20

Q9. 1 : 1 : : 25 : ?
(a) 26 **(b) 625** (c) 125 (d) 240

Direction In each of the following questions four words have been given out, out of which three are alike in some manner and the fourth one is different. Choose out the odd one.

Q10. **(a) Rhea** (b) Trout (c) Lamprey (d) Salmon

Q11. (a) Commander (b) Commodore **(c) Brigadier** (d) Admiral

Q12. (a) Microscope (b) Telescope (c) Periscope **(d) Stethoscope**

Q13. (a) Thyroxin (b) Adrenalin **(c) Iodine** (d) Insulin

Direction In these questions the letters in a word are replaced by certain other letters according to a specific rule to form its code. You are required to detect the coding pattern/ rule and answer the questions accordingly.

Q14. In a certain language, OPERATION is written as NODQBUJPO. How is INVISIBLE written in the code?
(a) JOWJTJCMF (b) JOWJTHAKD **(c) HMUHTJCMF** (d) HMUHTHAKD

Q15. In a certain code language, PLEADING is written as FMHCQMFB. How is SHOULDER written in the code?
(a) KCDQTIPV **(b) QDCKTIPV** (c) QDCKVPIT (d) TIPVQDCK

Q16. In a certain code language, GAMBLE is written as FBLCKF. How is FLOWER written in the code?
(a) HNQYGT **(b) EMMXDS** (c) GKPVFQ (d) GMPVDS

Directions: In these type of questions generally a set, group or series of numerals is given and you are required to trace out the numerals following certain given conditions.

Q17. Sam ranked 9th from top and 38th from the bottom in the class. How many students are there in the class?
(a) 45 **(b) 46** (c) 47 (d) 48

Q18. Manoj and Sachin are ranked 7th and 11th respectively from top in a class of 31 students. What will be their respective ranks from the bottom in the class?
(a) 20thand 24th (b) 24thand 20th **(c) 25thand 21th** (d) 26thand 22th

Q19. In a row of boys, A is 15th from the left and B is 4th from the right. There are three boys between A and B. C is just left of A. What is C's position from the right?
(a) 9th (b) 10th (c) 12th (d) 13th

Q20. Richard is 15th from in a column of boys, there were thrice as many behind him as there were in front. How many boys are there between Richard and the 7th boy from the end of the column?
(a) 33 (b) 34 **(c) 35** (d) None of these

Q21. N rank 5th the class, S is 8th from the last. If T is 6th after N and just in the middle of N and S, then how many students are there in the class?
(a) 23 (b) 24 (c) 25 (d) 26

Q22. In a row of 21 girls when Monica was shifted by four places towards the right, she became 12th from the left end. What was her earlier position from the right end of the row?
(a) 8th (b) 10th (c) 12th **(d) 14th**

Directions: In these type of questions some particular objects are assigned code names, then a question is asked that is to be answered in the code language.

Q23. If sand is called air, air is called plateau, plateau is called well, well is called island, island is called sky, then from where will a women draw water?
(a) island (b) well (c) sky (d) air

Q24. If cloud is called white, white is called rain, rain is called green, green is called air , air is called blue and blue is called water, where will the birds fly?
(a) air **(b) blue** (c) cloud (d) white

Q25. If water is called food, food is called tree, tree is called sky, sky is called wall, on which of the following grows a fruit?
(a) water (b) food **(c) sky** (d) tree

Directions: In this type you are provided with substitutes for various mathematical symbols or numerals, followed by a question involving calculation of an expression or choosing the correct / incorrect equation. You are required to put in the real signs or numerals in the given equation and then solve the question.

Q26. If Q means to +, J means to x , T means - , K means ÷ , then 30 K 2 Q 3 J 6 T 5 = ?
(a) 18 (b) 31 **(c) 28** (d) 103

Q27. If P denotes ÷ , Q denotes X, R denote +, and S denotes –, then what is the value of 18 Q 12 P 4 R 5 S 6?
(a) 59 **(b) 53** (c) 63 (d) 65

Q28. If A stands for + B stands for – C stands for X, then what is the value of (10 C 4) A (4 C 4) B 6 ?
(a) 50 (b) 60 (c) 56 (d) 46

Directions: In each of the following questions, clues are given regarding comparisons among set of persons, things, direction, age, time, numbers etc. You are required to analyse the whole information and answer the given question accordingly.

Q29. If a 1 mm thick paper is folded so that the area is halved at every fold, then what would be the thickness of the pile after

50 folds?

(a) 100 km (b) 1000 km (c) 1 million km **(d) 1 billion km**

Q30. A was born 2 years after his father's marriage, his mother is 5 years younger than his father, but 20 years old than A, who is 10 years old. At what age did the father get married?

(a) 35 years (b) 25 years **(c) 23 years** (d) 33 years

Q31. A father tells his son "I was of your present age when you were born". If the father is 36 now, how old was the boy 5 years back?

(a) 15 years **(b) 13 years** (c) 17 years (d) 20 years

Q32. A father is now 3 times old as his son. 5 years back, he was 4 times old as his son. The age of the son (in years) is ?

(a) 15 years (b) 12 years (c) 18 years (d) 20 years

Q33. A woman says, "If you reverse my own age the figures represents my husband's age. He is, of course, senior to me and the difference between our ages is 1/11th of their son". The women's age is ?

(a) 23 years (b) 34 years **(c) 45 years** (d) 50 years

Q34. In a group of 15 people, 7 read French, 8 read English, while 3 of them read none of these two. How many of them read French and English both ?

(a) 0 **(b) 3** (c) 4 (d) 5

Q35. M went to movies 9 days ago. She goes to the movies only on Thursdays. What day of the week is today ?

(a) Thursday **(b) Saturday** (c) Sunday (d) Tuesday

Q36. If 30th January 2003 was Thursday what was the day on 2nd Mar 2003 ?

(a) Sunday (b) Tuesday (c) Thursday (d) Saturday

Directions: In each of the following questions, a matrix of certain characters is given. These characters follow a certain trend, row-wise or column wise. Find out this trend and choose the missing character accordingly..

Q37.

4	5	6
2	3	7
1	8	3
21	98	?

(a) 94 (b) 76 (c) 73 (d) 16

Q38.

963	2	844
464	?	903

(a) 1 **(b) 2** (c) 3 (d) 4

Q39.

7	4	5
8	7	6
3	3	?
29	19	31

(a) 3 (b) 4 **(c) 5** (d) 6

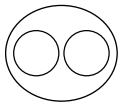
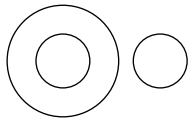
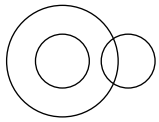
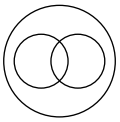
Q40.

42	44	38
23	55	28
37	?	39

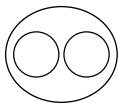
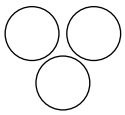
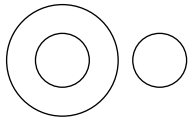
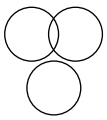
(a) 22 (b) 33 (c) 66 (d) 677

Directions: Each of these questions given below contains three elements. These elements may or may not have some inter-linkage. Each group of elements may fit into one of these diagrams at (a), (b), (e) or (d). You have to indicate the group of elements which correctly fits into the diagrams.

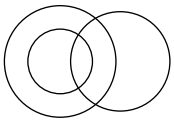
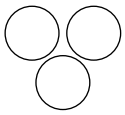
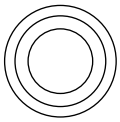
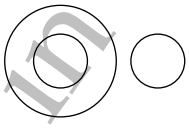
Q41. Which of the following diagrams indicates the best relation between Doctors, Human Beings and Married People?

(a)  (b)  (c)  **(d)** 

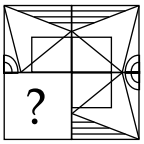
Q42. Which of the following diagrams indicates the best relation between Man, Worker and Garden?

(a)  (b)  (c)  **(d)** 

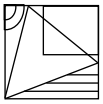
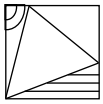
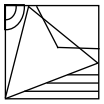
Q43. Which of the following diagrams indicates the best relation between Males, Cousins and Nephews?

(a)  (b)  (c)  (d) 

Directions: In each of the following questions, select a figure from amongst the four alternatives, which when placed in the blank space of figure (X) would complete the pattern .

Q44. 

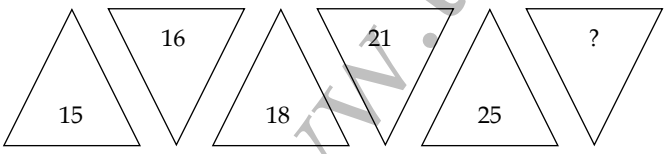
(x)

(a)  (b)  (c)  (d) 

Q45. In the following, a set of figures carrying certain characters is given. Assuming that the characters follow a similar pattern, find the missing character.

(a) 28 **(b) 30** (c) 35 (d) 27

Directions: In the following, series of numbers are given following a certain pattern. One term in the number series is wrong. Find the wrong term. .



Q46. 196, 169, 144, 121, 80
(a) 80 (b) 121 (c) 169 (d) 196

Q47. 1, 3, 7, 15, 27, 63, 127
(a) 7 (b) 15 **(c) 27** (d) 63

Directions: Choose the odd numeral pair/ group which is different from the others.

Q48. (a) 95 – 82 (b) 69 – 56 (c) 55 – 42 **(d) 48 – 34**

Q49. **(a) 11 – 115** (b) 10 – 90 (c) 9 – 72 (d) 8 – 56

Q50. (a) 81 – 63 **(b) 24 – 48** (c) 21 – 15 (d) 13 – 39

PART–II : ELEMENTARY MATHEMATICS

Q51. A number, which divided by 987, gives a remainder 59. When the same number is divided by 21 what is the remainder?

(a) 21 (b) 19 **(c) 17** (d) 15

Q52. If a positive integer leaves remainder 28 when divided by 143, then what is the remainder obtained on dividing the same number by 13?

(a) 0 **(b) 2** (c) 9 (d) 10

Q53. $(N^{p-1} - 1)$ is a multiple of p, if N is prime to p and p is a?

(a) Prime number **(b) Rational number** (c) **Real number** (d) **Composite number**

Q54. LCM of two numbers is 16 times their HCF. The sum of LCM and HCF is 850. If one number is 50, then what is the other number?

(a) 800 (b) 1200 (c) 2400 (d) 1600

Q55. The HCF of two numbers is 98 and their LCM is 2352. The sum of the numbers may be?

(a) 1372 (b) 1398 (c) 1426 (d) 1484

Q56. How many numbers between 500 and 1000 are divisible by 13?

(a) 36 (b) 37 **(c) 38** (d) 39

Q57. Which one of the following is a non-terminating and repeating decimal?

(a) $\frac{13}{8}$ (b) $\frac{3}{16}$ **(c) $\frac{3}{11}$** (d) $\frac{137}{25}$

Q58. Which among the following is the largest?

(a) $\frac{7}{9}$ **(b) $\frac{11}{14}$** (c) $\frac{3}{4}$ (d) $\frac{10}{13}$

Q59. What is the square root of $9 + 2\sqrt{14}$?

(a) $1 + 2\sqrt{2}$ (b) $\sqrt{3} + \sqrt{6}$ **(c) $\sqrt{2} + \sqrt{7}$** (d) $\sqrt{2} + \sqrt{5}$

Q60. What is the smallest number that must be added to 1780 to make it perfect square?

(a) 39 (b) 49 (c) 59 **(d) 69**

Q61. If salary of X is 20% more than salary of Y, then by how much percentage is salary of Y less than X?

(a) 25 (b) 20 **(c) $\frac{50}{3}$** (d) $\frac{65}{4}$

Q62. A student has to secure 40% of marks to pass an exam. He gets only 45 marks and fails by 5 marks. The maximum marks are?

(a) 120 **(b) 125** (c) 130 (d) 150

Q63. What is the number which has to be added to each term of the ratio 49 : 68, so that it becomes 3 : 4?

(a) 3 (b) 5 **(c) 8** (d) 9

Q64. The sum of the age of a father and the age of a son is 75 years. If the product of their ages before 5 years was 750, then what is the present age of the father?

(a) 60 **(b) 55** (c) 52 (d) 50

Q65. The fourth proportional to 7, 11, 14 is

(a) 16 (b) 18 (c) 20 **(d) 22**

Q66. The average weight of a class of 15 boys and 10 girls is 38.4 kg. If the average weight of the boys is 40 kg, then what is the average weight of the girls ?

(a) 36.5 kg (b) 35 kg **(c) 36 kg** (d) 34.6 kg

Q67. In a class of 100 students, there are 70 boys whose average marks in a subject are 75. If the average marks of the complete class is 72, then what is the average marks of the girls?

(a) 64 **(b) 65** (c) 68 (d) 74

Q68. The sum of two numbers is 7 and the sum of their squares is 25. The product of the two number is?

(a) 6 (b) 10 **(c) 12** (d) 15

Q69. The sum which amounts to Rs 364.80 in 8 years at 3.5% simple interest per annum is?

(a) Rs. 285 (b) **Rs. 280** (c) **Rs. 275** (d) **Rs. 270**

Q70. When an article is sold at 20% discount, the selling price is Rs 24. What is the selling price when the discount is 30% ?

(a) Rs. 25 (b) Rs. 23 **(c) Rs. 21** (d) Rs. 20

Q71. By giving 25% discount a trader earns 25% profit. If he sells the item at 10% discount, what is the profit?

(a) 10% (b) 40% (c) 45% **(d) 50%**

Q72. A man buys 200 oranges for Rs. 1000. How many oranges for Rs 100 can be sold so that his profit percentage is 25% ?
(a) 10 (b) 14 **(c) 16** (d) 20

Q73. A car is travelling at a constant rate of 45 km/h. The distance travelled by car from 1040 AM to 1 PM is ?
(a) 165 kms (b) 150 kms (c) 120 kms **(d) 105 kms**

Q74. A man rows downstream 32 kms and 14 kms upstream, and he takes 6 hours to cover each distance. What is the speed of the current ?
(a) 0.5 km/h (b) 1 km/h **(c) 1.5 km/h** (d) 2 km/h

Q75. A boy went to his school at the speed of 12 km/h and returned to his house at the speed of 8 km/h. If he has taken 50 minutes for the whole journey, what was the total distance walked ?
(a) 4 km **(b) 8 km** (c) 16 km (d) 20 km

Q76. A can finish a work in 15 days, B in 20 days and C is 25 days. All these three worked together and earned Rs. 4700. The share of C is ?
(a) Rs 1200 (b) Rs 1500 (c) Rs 1800 (d) Rs 2000

Q77. If 5 tractors can plough 5 hectares of land in 5 days, then what is the number of tractors required to plough 100 hectares in 50 days ?
(a) 100 (b) 20 **(c) 10** (d) 5

Q78. What is the simplified form of $9\sqrt{2} - \sqrt{8} - 4\sqrt{2}$?
(a) $4\sqrt{2}$ **(b) $3\sqrt{2}$** (c) $2\sqrt{2}$ (d) 2

Q79. The shadow of a pole 6 mtr high is 15 mtr long and at the same time the shadow of a tree is 25 mtr long. What is the height of the tree?
(a) 21 mtr **(b) 10 mtr** (c) 35 mtr (d) 41 mtr

Q80. If one-third of a two-digital number exceeds its one-fourth by 8, then what is the sum of the digits of the number?
(a) 6 (b) 13 **(c) 15** (d) 17

Q81. A number consists of two digits whose sum is 8. If 18 is added to the number, the digits are reversed. The number is equal to?
(a) 26 **(b) 35** (c) 53 (d) 62

Q82. Which of the following statement is true in respect of the expression $\sin 31^o + \sin 32^o$?
(a) Its value is 0 (b) Its value is 1
(c) Its value is less than 1 **(d) Its value is greater than 1**

Q83. If $1 + \tan\theta = \sqrt{2}$, then what is the value of $\cot\theta - 1$?
(a) $\frac{1}{\sqrt{2}}$ **(b) $\sqrt{2}$** (c) 2 (d) $\frac{1}{2}$

Q84. If $\tan\theta = \frac{3}{}$ and θ is acute, then what is the value of $\sin\theta$?
(a) $-\frac{3}{5}$ **(b) $\frac{3}{5}$** (c) $\frac{4}{5}$ (d) $\frac{-4}{5}$

Q85. What is $\sin 25^o \sin 35^o \sec 65^o \sec 55^o$ equal to
(a) **- 1** (b) **0** (c) $\frac{1}{2}$ **(d) 1**

Q86. Which one of the following triples does not represent the sides of a triangle?
(a) (3, 4, 5) (b) (4, 7, 10) (c) (3, 6, 8) **(d) (2, 3, 6)**

Q87. A round balloon of unit radius subtends an angle of 90 at the eye of an observer standing at a point, say A. What is the distance of the centre of the balloon from point A?
(a) $1\sqrt{2}$ (b) $\sqrt{2}$ (c) 2 (d) $\frac{1}{2}$

Q88. What is the angle of elevation of the sum when the shadow of a pole is $\sqrt{3}$ times the length of the pole?
(a) 30^o (b) 45^o (c) 60^o (d) 75^o

Q89. If $\beta = 30^o$, then what is the value of $\tan\alpha$?
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{5}$

Q90. From the top of a building 90 mtr high, the angle of depression from the top and the bottom of a tree are 30^o and 45^o respectively. What is the height of the tree?
(a) $30\sqrt{3}$ mtr (b) $90 - 30\sqrt{3}$ mtr **(c) $90 + 30\sqrt{3}$ mtr** (d) $60 + 30\sqrt{3}$ mtr

Q91. What is the area of a right angled isosceles triangle whose hypotenuse is $6\sqrt{2}$ cm?
(a) 12 cm^2 **(b) 18 cm^2** (c) 24 cm^2 (d) 36 cm^2

Q92. The diameter of a circle circumscibing a square is $15\sqrt{2}$ cm. then what is the length of the side of the square?
(a) 15 cm (b) 12 cm (c) 10 cm (d) 7.5 cm

Q93. How many 200 mm lengths can be cut from a 10 mtr of ribbon?
(a) 50 (b) 40 (c) 30 (d) 20

Q94. The ratio of the outer and inner perimeters of a circular path is 23 : 22. If the path is 5 mtr wide, the diameter of the inner circle is?
(a) 55 mtr. (b) 110 mtr. **(c) 220 mtr.** (d) 230 mtr.

Q95. The product of the lengths of the diagonals of a square is 50 square units. What is the length of a side of the square?
(a) $5\sqrt{2}$ units **(b) 5 units** (c) 10 units (d) $2\sqrt{5}$ units

Q96. From a cylindrical log whose height is equal to its diameter, the greatest possible sphere has been taken out. What is the fraction of the original log which is cut away?
(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ **(d) $\frac{2}{3}$**

Q97. The diagonal of a cube is $4\sqrt{2}$ cm. what is its volume?
(a) 16 cu cm. (b) 32 cu cm. **(c) 64 cu cm.** (d) 192 cu cm.

Q98. If the size of a cube is increased by 100% then by what percentage is the surface area of the cube increased ?
(a) 150% (b) 200% **(c) 300%** (d) 400%

Q99. What is the least number of straight lines for a bounded plane figure?
(a) 1 (b) 2 **(c) 3** (d) 4

Q100. There are five lines in a plane, no two of which are parallel. The maximum number of points in which they intersect is ?
(a) 4 (b) 6 **(c) 10** (d) None of the above

PART–II : ELEMENTARY MATHEMATICS
ANSWER PRACTICE TEST PAPER - 1

51. (c) 17

Explanation:

$$21 \overline{)\ 59\ (\ 2} \quad 42 \quad 17$$

Remainder will be 17 when divided by 21.

52. (b) 2

Explanation:

$$13 \overline{)\ 28\ (\ 2} \quad 26 \quad 2$$

Remainder will be 2 when divided by 13.

53. (a) Prime Number

Explanation:

Given that N is prime to p, that means N and p are two co-prime numbers.

Since $(N^{(p-1)} - 1)$ is a multiple of p;

$\therefore (N^{(p-1)} - 1) = k \times p$

$\Rightarrow k = (N^{(p-1)} - 1)/p$

Let p = 5 and N = 2 *(Co-prime numbers with p being a prime number)*

$\therefore k = (2^4 - 1)/5 = 15/5 = 3$ *(integer)*

That means the given condition satisfies.

Again take p = 4 and N = 3 *(Co-prime numbers with p being a non-prime number)*

$\therefore k = (3^3 - 1)/4 = 26/4 = 6.5$ *(Not a integer)*

That means the given condition does not satisfies.

p must be a prime number only.

54. (a) 800

Explanation: Let HCF = x

LCM = 16 × HCF

= 16x

LCM + HCF = 850

16x + x = 850

17x = 850

$x = \frac{\cancel{850}^{50}}{\cancel{17}_{1}}$

other number 16x = 16 × 50 = 800

55. (b) 1078

Explanation:

Product of two numbers = HCF × LCM

Product of two numbers = 98 × 2352

= 98 × 98 × 24

= (98 × 3) × (24 × 8)

= 294 × 784

Sum of number = 294 + 784

= 1078

56. (c) 38

Explanation:

500 1000

507 988

507 + (n – 1)13 = 988

507 + 13n – 13 = 988

13n + 494 = 988

13n = 988 – 494

13n =494

$n = \frac{\cancel{494}^{38}}{\cancel{13}_{1}}$

38

57. (c) $\frac{3}{11}$

Explanation:

$$8 \overline{)\ 13.000\ (\ 1.625} \quad 8 \quad 50 \quad 48 \quad 20 \quad 16 \quad 40 \quad 40 \quad \times$$

It is terminating

$$16 \overline{)\ 3.000\ (\ 0.1875} \quad 16 \quad 140 \quad 128 \quad 120 \quad 112 \quad 80 \quad 80 \quad \times$$

It is terminating

$$11 \overline{)\ 3.00\ (\ 0.27} \quad 22 \quad 80 \quad 77 \quad 3$$

Clearly It is non terminating

58. (b) $\frac{11}{14}$

Explanation:

$\frac{7}{9}$ *= 0.777 .....*

$\frac{11}{14}$ *= 0.78 .....*

$\frac{3}{4}$ *= 0.75 .....*

$\frac{10}{13}$ *= 0.76 .....*

59. (c) $\sqrt{2} + \sqrt{7}$

Explanation:

$9 + 2\sqrt{14}$

$= 7 + 2 + 2 \times \sqrt{7} \times \sqrt{2}$

$= \sqrt{7}^2 + \sqrt{2}^2 + 2 \times \sqrt{7} \times \sqrt{2}$

$= (\sqrt{7} + \sqrt{2})^2$

60. (d) *69*

Explanation

$$\begin{array}{r|l} & 43 \\ \hline 4 & 17\,80 \\ & 16 \\ \hline 83 & 180 \\ & 249 \\ \hline & 69 \end{array}$$

69 must be added to 1780 to make it a perfect square.

61. (c) $\frac{50}{3}$

Explanation:

$\frac{20}{100 + 20} \times 100$

$\frac{\cancel{20}^{5}}{\cancel{120}_{3}} \times \cancel{100} = \frac{50}{3}$

62. (b) 125

Explanation:

Let maximum marks are x

40% of x = 50 *[45 + 5 = 50]*

$\frac{40}{100} \times 100 = 50$

$x = \cancel{50} \times \frac{\overset{25}{\cancel{100}}}{\underset{1}{\cancel{40}}} = 125$

63. (c) *8*

Explanation: Let x should be added

$\frac{49 + x}{68 + x} = \frac{3}{4}$

$196 + 4x = 204 + 3x$

$4x - 3x = 204 - 196$

$x = 8$

64. (b) 55

Explanation:

Let ages of father and son be x and 75 - x

Their ages 5 years ago = x – 5,

$75 - x - 5 = 70 - x$

$(x - 5)(70 - x) = 750$

$70x - x^2 - 350 + 5x = 750$

$-x^2 + 75x - 350 - 750 = 0$

$-x^2 + 75x - 1100 = 0$

$x^2 - 75x + 1100 = 0$

$x^2 - 55x - 20x + 1100 = 0$

$x(x - 55) - 20(x - 55) = 0$

$(x - 20)(x - 55) = 0$

$x - 55 = 0$

$x = 55$

65. (d) 22

Explanation:

Let fourth proportional be x

$7 : 11 : 14 : x$

$7 \times x = 11 \times 14$

$x = \frac{11 \times \cancel{14}^{2}}{\underset{1}{\cancel{7}}} = 22$

66. (c) 36 kg

Explanation:

Let average weight of girls be x

$\frac{15 \times 40 + 10 \times x}{15 + 10} = 38.4$

$600 + 10x = 38.4 \times 25$

$600 + 10x = \frac{\overset{192}{\cancel{384}}}{\underset{2}{\cancel{10}}_{1}} \times \overset{5}{\cancel{25}}$

$600 + 10x = 960$

$10x = 360$

$x = 36$

67. (b) 65

Explanation:

Let average marks of girls be x

No. of girls = 100 – 70 = 30

$\frac{70 \times 75 + 30 \times x}{100} = 72$

$5250 + 30x = 7200$

$30x = 7200 - 5250$

$30x = 1950$

$x = \frac{\overset{65}{\cancel{1950}}}{\underset{1}{\cancel{30}}} = 65$

68. (c) 12

Explanation:

Let the numbers be x, 7 – x

$x^2 + (7 - x)^2 = 25$

$x^2 + 49 + x^2 - 14x = 25$

$2x^2 - 14x + 24 = 0$

$x^2 - 7x + 12 = 0$

$x^2 - 3x - 4x + 12 = 0$

$x(x - 3) - 4(x - 3) = 0$

$(x - 3)(x - 4) = 0$

$x - 3 = 0 \quad x - 4 = 0$

$x = 3 \qquad x = 4$

Numbers are = 3, 7 – 3

3, 4

Product = $3 \times 4 = 12$

69. (a) Rs 285

Explanation:

Let the numbers be x

$$x + \frac{x \times 8 \times 3.5}{100} = 364.80$$

$$x + \frac{x \times 8 \times 35}{1000} = \frac{36480}{100}$$

$$x + \frac{28x}{100} = \frac{36480}{100}$$

$$\frac{128}{100}x = \frac{36480}{100}$$

$$x = \frac{36480}{128} \Rightarrow x = 285$$

70. (c) Rs 21

Explanation:

Let MP = x

$$x \times \frac{80}{100} = 24$$

$$x = 24 \times \frac{100}{80} = 30$$

$$SP = 30 \times \frac{70}{100} = 21$$

71. (d) 50%

Explanation:

Let MP = 100

SP = 75

$$CP = 75 \times \frac{100}{125} = 60$$

New SP = 90

Profit = 90 - 60 = 30

$$\text{Profit \%} = \frac{30}{60} \times 100 = 50\%$$

72. (c) 16

Explanation:

$$CP \text{ of 1 orange} = \frac{1000}{200} = ₹ 5$$

$$SP = 5 \times \frac{125}{100} = 6.25$$

$$\text{No. of orangs} = \frac{100}{6.25} = \frac{100 \times 100}{625} = 16$$

73. (d) 105 km.

Explanation:

Time taken = 1PM – 10:40AM = 2hours 20 min.

$$= 2\frac{20}{60} = \frac{7}{3} \text{ hrs.}$$

Speed = 45 km/h.

distance = speed × time

$$= 45 \times \frac{7}{3} = 105 \text{km.}$$

74. (d) 1.5 km/h

Explanation:

Let speed of stream in still water be x and speed of stream be y

$$\frac{32}{x + y} = 6 \qquad \frac{16}{x - y} = 6$$

$$x + y = \frac{32}{6} \ldots (1) \qquad x - y = \frac{14}{6} \ldots (2)$$

adding (1) & (2)

$$\begin{array}{rl} x + y & = \frac{16}{3} \\ x - y & = \frac{7}{3} \\ \hline 2x & = \frac{23}{3} \end{array}$$

$$x = \frac{23}{6}$$

$$x + y = \frac{16}{3}$$

$$\frac{23}{6} + y = \frac{16}{3}$$

$$y = \frac{16}{3} - \frac{23}{3} = \frac{32 - 23}{6}$$

$$= \frac{30}{6} = 1.5 \text{ km/h.}$$

75. (b) 8 km

Explanation:

$$\frac{d}{12} + \frac{d}{8} = \frac{50}{60}$$

$$\frac{2d + 3d}{24} = \frac{5}{6}$$

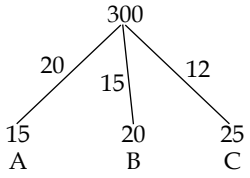
$$\frac{5d}{24} = \frac{5}{6}$$

$$d = \frac{5}{6} \times \frac{24}{5} = 4$$

Total distance = 4 + 4 = 8 km

76. (a) 1200

Explanation:



Work done in 1 day = 20 + 15 + 12 = 47

Share of C $= \frac{12}{\cancel{47}} \times \cancel{4700} = 1200$

77. (c) 10

Explanation:

5 tractors can plough 5 hectares is 5 days

5 tractors can plough 50 hectares in 50 days

1 tractors can plough 10 hectares in 50 days

No. of tractors needed to plough 100 hectares $= \frac{10\cancel{0}}{1\cancel{0}}$

$= 10$

78. (b) $3\sqrt{2}$

Explanation:

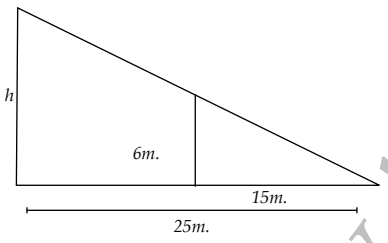
$9\sqrt{2} - \sqrt{8} - 4\sqrt{2}$

$9\sqrt{2} - 2\sqrt{2} - 4\sqrt{2}$

$9\sqrt{2} - 6\sqrt{2} = 3\sqrt{2}$

79. (b) 10 m.

Explanation



Let height of tree be h

$\frac{h}{25} = \frac{6}{15}$

$h = \frac{\cancel{6}^{2} \times \cancel{25}^{5}}{\cancel{15}_{\cancel{5}}} = 10$ m.

80. (c) 15

Explanation

Let number be x

$\frac{x}{3} - \frac{x}{4} = 8$

$\frac{4x - 3x}{12} = 8$

$\frac{x}{12} = 8$

$x = 96$

sum of digits = 9 + 6 = 15

81. (b) 35

Explanation

Let units digit = x

tens digit = 8 – x

Two digit number = 10(8 – x) + x

= 80 – 10x + x

= 80 – 9x

Number obtained on revering the digit = 10 × x + 8 – x

= 9x + 8

80 – 9x + 18 = 9x + 8

98 – 8 = 18x

90 = 18x

x = 5

Number = 80 – 9x

= 80 – 9 × 5

= 80 – 45 = 35

82. (d) Its value is greater than 1

Explanation

sin 31° + sin 32°

$\sin 30^\circ = \frac{1}{2}$

$\text{So, } \sin 31^\circ > \frac{1}{2}$

$\sin 32^\circ > \frac{1}{2}$

so sin 31° + sin 32° > 1

83. (b) $\sqrt{2}$

Explanation

$1 + \tan\theta = \sqrt{2}$

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

$\cot\theta = \frac{1}{\tan\theta} = \frac{1}{\sqrt{2} - 1}$

$= \frac{1}{\sqrt{2} - 1} \times \frac{\sqrt{2} + 1}{\sqrt{2} + 1} = \sqrt{2} + 1$

$\cot\theta - 1 = \sqrt{2} + 1 - 1 = \sqrt{2}$

84. (b) $\frac{3}{5}$

Explanation

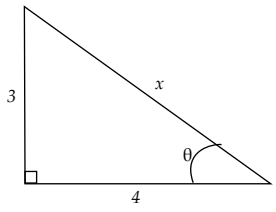
$\tan\theta = \frac{3}{4}$

$x^2 = 3^2 + 4^2$

$x^2 = 9 + 16 = 25 = 5^2$

$x = 5$

$\sin\theta = \frac{3}{x} = \frac{3}{5}$



85. (d) *1*

Explanation

sin 25° sin 35° sec 65° sec 55°

$\sin 25^\circ \sin 35^\circ \times \frac{1}{\cos 65^\circ} \times \frac{1}{\cos 55^\circ}$

$\cancel{\cos 65^o} \times \cancel{\cos 55^o} \times \frac{1}{\cancel{\cos 65^o}} \times \frac{1}{\cancel{\cos 55^o}} = 1$

86. (d) 2, 3, 6

Explanation

2, 3, 6

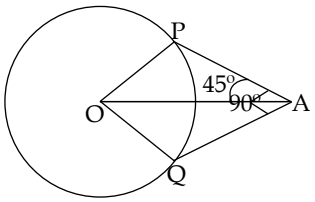
$2 + 3 = 5 < 6$

but sum of two sides is greater than third side

87. (b) $\sqrt{2}$

Explanation

$\angle 1 = \frac{90^o}{2} = 45^o$



In ΔOAP

$\frac{OP}{AO} = \sin 45^o$

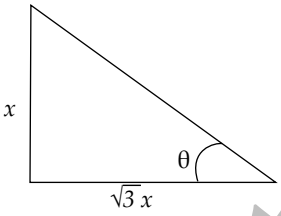
$\frac{1}{AO} = \frac{1}{\sqrt{2}}$

$OA = \sqrt{2}$

88. (a) 30^o

Explanation

$\tan = \frac{x}{\sqrt{3}x} = \frac{1}{\sqrt{3}}$



$\tan \theta = \tan 30^o$

$\theta = 30^o$

89. (d) ?

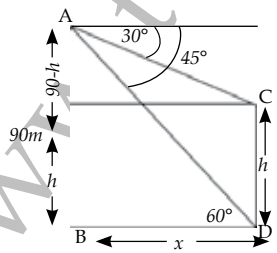
Explanation:

$\beta = 30^o$ *Statement is not complete.*

90. (b) ??

Explanation:

Let height of tree be h



$\frac{90}{x} = \tan 45^o$

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

$x = 90$

$\frac{90 - h}{30} = \tan 30^o$

$\frac{90 - h}{30} = \frac{1}{\sqrt{3}}$

$(90 - h)\sqrt{3} = 30$

$90\sqrt{3} - \sqrt{3}h = 30$

$90\sqrt{3} - 30 = \sqrt{3}h$

$h = \frac{90\sqrt{3} - 30}{\sqrt{3}}$

$= \frac{90\sqrt{3} - 30}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{270 - 90\sqrt{3}}{3} = 90 - 10\sqrt{3}$

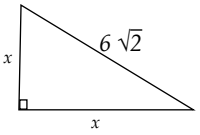
All options are wrong.

91. (b) 18 cm^2

Explanation:

Let base and height be x

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



$2x^2 = 72$

$x^2 = 36$

$x = 6$

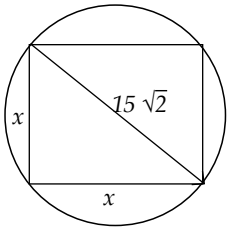
$\text{In of} = \frac{1}{\cancel{2}} \times 6 \times \cancel{6}^{3} = 18 cm^2$

92. (a) 15 cm

Explanation:

diameter= 15 cm

Let side of square be x



$x^2 + x^2 = (15\sqrt{2})^2$

$2x^2 = 450$

$x^2 = 225$

$\cancel{x^2} = \cancel{15^2}$

$x = 15$

93. (a) 50

Explanation:

10 meters = 10 × 1000 = 10000mm.

Length of 1 piece = 200 mm.

$\text{No. of pieces} = \frac{\cancel{10000}^{50}}{\cancel{200}_{1}} = 50$

94. (c) 220 m.

Explanation:

Let outer and inner perimeters = 23x and 22x

$2\pi r_1 = 23x$ $\qquad$ $2\pi r_2 = 22x$

$2\pi r_1 - 2\pi r_2 = x$

$r_1 - r_2 = \frac{x}{2\pi}$

$\frac{x}{2\pi} = 5$ $\qquad$ $x = 10\pi$

$2\pi r_2 - 22 \times 10\ \pi$

$\cancel{2\pi} r_2 - 22 \times 10 \cancel{\pi}$

$r_2 = \frac{\cancel{22}^{11} \times 10}{\cancel{2}_{1}} = 110m.$

Radious

Diameter = 2 × radious

$= 2 \times 110 = 220\ m.$

95. (b) 5

Explanation:

$d^2 = 50$

$x^2 + x^2 = d^2$

$2x^2 = 50$

$2x^2 = 25$

$x = 5$

96. (b) $\frac{2}{3}$

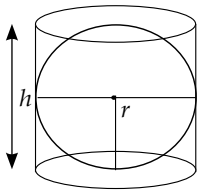
Explanation:

$h = 2r$

volume of cylinder $= \pi r^2 h$

$= \pi r^2 \times 2r$

$= 2\pi r^3$



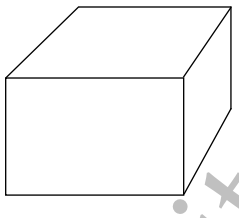
volume of sphere $= \frac{4}{3}\pi r^3$

fraction $= \frac{\frac{4}{3}\pi r^3}{2\pi r^3} = \frac{2}{3}$

97. (c) 64 cm^3

Explanation:

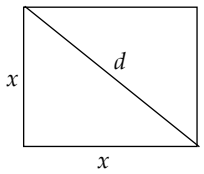
$\sqrt{3}$ *side* $= 4\sqrt{3}$



side = 4

volume $= 4 \times 4 \times 4 = 64\ cm^3$

98. (a) 300%



Explanation:

Let side = x

S. A. $= 6x^2$

new side = x + 100% *of* x

$x + \frac{100}{100}x = 2x$

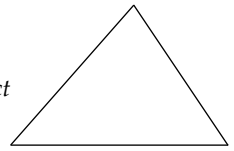
S.A. $= 6\,(2x)^2 = 6 \times 4x^2$

$= 24x^2$

% change in area $= \frac{18x^2}{6x^2} \times 100$

$= 300\%$

99. (c) 3



Explanation:

To bound a plane region 3 distinct lines are required

100. (c) 10

Explanation:

Required number of points $= 5C_2$

$\frac{5!}{3! \times 2!} = \frac{5 \times 4 \times 3!}{3! \times 2 \times 1} = 10$