

# Ld. Bentinck School

## PRE-BOARD EXAMINATION, SESSION (2023-24)

Sub- MATHEMATICS

Marks: 80

Time: 03 Hr, 00 Mins

Student Name: .....

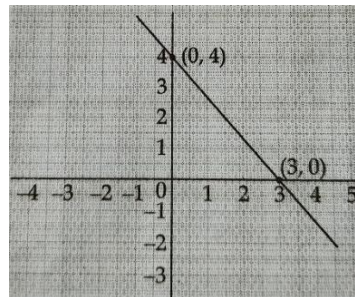
Class -X

### General Instruction:-

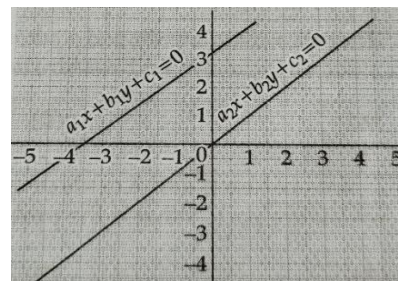
- i) This question paper contains 38 questions. All questions are compulsory.
- ii) Question paper is divided into FIVE sections – Section A, B, C, D & E.
- iii) In section A, question number 1 to 18 are multiple-choice questions (MCQs) and question number 19 and 20 are assertion reason-based questions of 1 mark each.
- iv) In section B, question number 21 to 25 are very short answer type questions of 2 marks each.
- v) In section C, question number 26 to 31 are short answer type questions carrying 3 marks each.
- vi) In section D, question number 32 to 35 are long answer type questions carrying 5 marks each.
- vii) In section E, question number 36 to 38 are case based integrated units of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case study.
- viii) There is no overall choice. However, an internal choice has been provided in 2 questions in section B, 2 questions in section C, 2 questions in section D and 3 questions in section E.
- ix) Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.
- x) Use of calculator is not allowed.

### SECTION-:A

1. If two positive integers a and b are written as  $a = x^3y^2$  and  $b = xy^3$ , where x, y are prime numbers, then the result obtained by dividing the product of the positive integers by the LCM (a,b) is
  - a) xy
  - b)  $xy^2$
  - c)  $x^3y^3$
  - d)  $x^2y^2$
2. The given linear polynomial  $y = f(x)$  has



- a) 2 zeroes
  - b) 1 zero and the zero is '3'
  - c) 1 zero and the zero is '4'
  - d) no zero
3. The lines representing the given pair of linear equations are non-intersecting. Which of the following statements is true?



- a)  $\frac{1}{2} = \frac{1}{2} = \frac{1}{2}$       b)  $\frac{1}{2} = \frac{1}{2} \neq \frac{1}{2}$       c)  $\frac{1}{2} \neq \frac{1}{2} = \frac{1}{2}$       d)  $\frac{1}{2} \neq \frac{1}{2} \neq \frac{1}{2}$

4. The nature of roots of the quadratic equation  $9x^2 - 6x - 2 = 0$  is:

- a) No real roots      b) 2 equal real roots      c) 2 distinct real roots      d) more than 2 Real roots.

5. Two Aps have the same common difference. The first term of one of these is -1 and that of the other is -8. The difference between their 4<sup>th</sup> term is:

- a) 1      b) -7      c) 7      d) 9

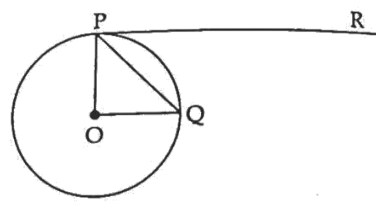
6. What is the ratio in which the line segment joining (2,-3) and (5,6) is divided by x-axis?

- a) 1:2      b) 2:1      c) 2:5      d) 5:2

DE = x, BE = b and EC = c. Then x expressed in terms of a, b and c is:

- a) —      b) —      c) —      d) —

9. If O is centre of a circle and chord PQ makes an angle  $50^\circ$  with the tangent PR at the point of contact P, then the angle subtended by the chord at the centre is:



- a)  $130^\circ$       b)  $100^\circ$       c)  $50^\circ$       d)  $30^\circ$

10. A quadrilateral PQRS is drawn to circumscribe a circle. If PQ = 12 cm, QR = 15 cm and RS = 14 cm, find the length of SP is:

- a) 15 cm      b) 14 cm      c) 12 cm      d) 11 cm

11. Given that  $\sin \theta = \frac{3}{5}$ , find  $\cos \theta$  is:

- a)  $\frac{4}{5}$       b)  $-\frac{4}{5}$       c)  $\frac{3}{4}$       d)  $-\frac{3}{4}$

12.  $(\sec A + \tan A)(1 - \sin A)$  equals:

- a)  $\sec A$       b)  $\sin A$       c)  $\operatorname{cosec} A$       d)  $\cos A$

13. If a pole 6 m high casts a shadow  $2\sqrt{3}$  m long on the ground, then the sun's elevation is:

- a)  $60^\circ$       b)  $45^\circ$       c)  $30^\circ$       d)  $90^\circ$

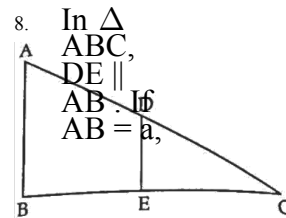
14. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is:

- a) 2 units      b) units      c) 4 units      d) 7 units

15. It is proposed to build a new circular park equal in area to the sum of areas of two circular parks of diameters 16m and 12 m in a locality. The radius of the new park is:

- a) 10 m      b) 15 m      c) 20 m      d) 24 m

7. point (x,y) is at a distance of 5 units from the origin. How many such points lie in the third quadrant?  
a) 0      b) 1





$\operatorname{cosec}(2A + B)$ . Show your Work.

Or,

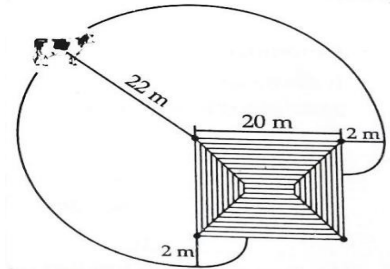
B) State whether the following statements are true and false. Give reasons

i) As the value of  $\sin$  increases, the value of  $\tan$  decreases.

ii) When the value of  $\sin$  is maximum, the value of  $\operatorname{cosec}$  is also maximum.  $0^\circ < < 90^\circ$

25. A) A cow is tied at one of the corners of a square shed. The length of the rope is 22 m. The cow can only eat the grass outside the shed as shown below.

What is the area that the cow can graze on? Show your steps.



Or,

B) The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.

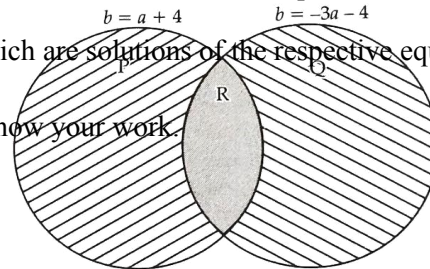
### SECTION-C

26. Find all pairs of positive integers whose sum is 91 and HCF is 13. Show your Work.

27. If one root of the quadratic equation  $3x^2 + px + 4 = 0$  is  $\frac{2}{3}$ , then find the value of  $p$  and the other root of the equation.

28. A) The two circles represent the ordered pairs,  $(a, b)$ , which are solutions of the respective equations. The circles are divided into 3 regions P, Q and R as shown.

Write one ordered pair each belonging to P, Q, and R. show your work.



Or,

B) Shown below is a pair of linear equations,

$$x + 0.999y = 2.999$$

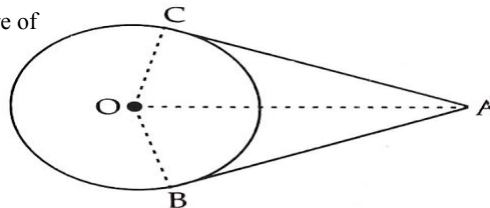
$$0.999x + y = 2.998$$

i) without finding the values of  $x$  and  $y$ , prove that  $x - y = 1$ .

ii) find the values of  $x$  and  $y$ . Show your work.

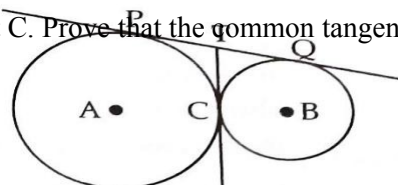
29. A) Given below is the diagram of pair of pulleys. The length of  $AC$  is 12 cm.

In the given Figure,  $\angle CAB = 20^\circ$ . What is the measure of  $\angle AOC$ ?



Or,

B) In given figure, two circle touch each other at the point C. Prove that the common tangent to the circles at C, bisects the common tangent at P and Q.



30. Prove that:

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

31. Arti owns a manufacturing company. She hires 5 supervisors and 20 operators of a 6 -months project. The table given below shows their salary breakup.

| position   | Salary for the two months      | Salary for the remaining months |
|------------|--------------------------------|---------------------------------|
| Supervisor | Between rs 18,000 to rs 20,000 | Between rs 22,000 to rs 25,000  |
| operator   | Between rs 8,000 to rs 10,000  | Between rs 13,000 to rs 15,000  |

The mean salary of five supervisors for the first two months is rupees 19,000.

The salary of three supervisors are rupees 18,000, rupees 18,500, and rupees 20,000 respectively.

Find the sum of other two supervisor’s salary for first two months.

**SECTION-D**

32. A) The difference of the squares of two numbers is 180. The square of the smaller number is 8 times the greater number. Find the two numbers.

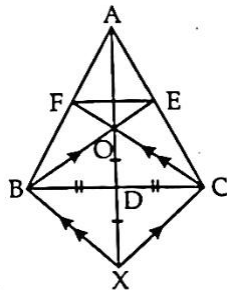
B) A shopkeeper buy certain number of books in rupees 80. If he buy 4 more books then new cost price of each book is reduced by rupees 1. Find the number of books initially he buy.

33. A) In a rain water harvesting system, the rain water from a roof  $22\text{m} \times 20\text{m}$  drains into a cylindrical tank having diameter of base 2 m and height 3.5m. If the tank is full, find the rainfall in cm. Write your views on water conservation.

B) Rohan wants to renovate his room. He calls an architect for this work to measure the room. The length, breadth and height of a room are 8 m 50 cm; 6m 25 cm and 4 m 75 cm respectively. He wants to put the longest rod that can measure the dimensions of the room exactly.

34. In  $\Delta ABC$ , AD is a median and O is any point on AD. BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that  $OD = DX$  as shown in figure. Prove that:

- i)  $EF \parallel BC$
- ii)  $AO:AX=AF:AB$

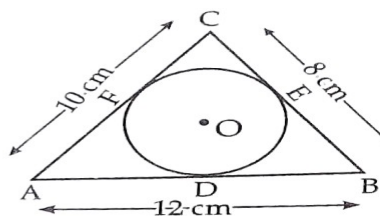


35. The first term of an A.P is 3, the last term is 83 and the sum of all its term is 903. Find the number of terms and the common difference of the A.P.

**SECTION – E**

36. Read the passage below and answer the question that follows:

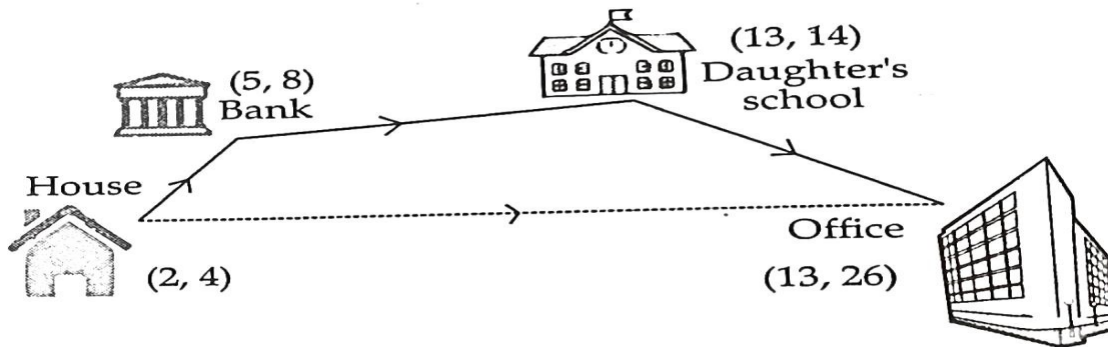
Varun has been selected by his school to design logo for sports day T-shirts for students and staff. The logo is designed in different geometrical shapes and different colours according to the theme. In given figure, a circle with centre O is inscribed in a  $\Delta ABC$ , such that it touches the sides AB, BC, and CA at points D, E and F respectively. The lengths of sides AB, BC and CA are 12 cm, 8cm and 10 cm respectively.



- i) Find the length of AD and BE.
- Or,
- ii) If the radius of the circle is 4 cm, find the area of  $\Delta OAB$ .
- iii) Find the perimeter of  $\Delta ABC$ .
- iii) Find the length of CF.

37. Read the following text and answer the following questions:

Ayush starts walking from his house to office. Instead of going to the office directly, he goes to a bank first, from there to his daughter's school and then reaches the office.



If the house is situated at (2,4), bank at (5,8), school at (13,14) and office at (13,26) and co-ordinates are in km.

- i) What is the distance between house and bank?
- ii) What is the distance daughter's school and office?
- iii) What is the extra distance travelled by Ayush?

38. Read the following text and answer the questions that follow:

An aeroplane is a vehicle with wings and one or more engines that enables it to fly through the air. Most people think about inventors of aeroplane was wrights brothers. We have discussed about an aeroplane as following:

An aeroplane at an altitude of 300 metres observes the angle of depression of opposite points on the two banks of a river to be  $45^\circ$  and  $60^\circ$ .

(use  $\sqrt{3} = 1.732$ )

- i) Find the value of y.
- ii) Find the value of x.

Or,

- iii) Find the distance PB.
- iv) Find the width AB of the river.

