

# SPECTRA PRE-BOARD EXAMINATION

## SPECTRA CLASSES

### CLASS 10<sup>TH</sup>

### SUBJECT-MATHEMATICS

TIME-3HR.

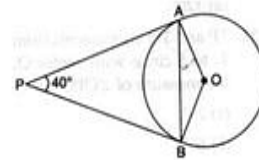
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General Instruction:

1. This Question paper contains - five sections A, B, C, D and E.
2. Section A has 20 MCQs and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 case based integrated units of assessment (4 marks each) with sub parts of the values of equal marks.
7. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 Qs of 3 marks and 2 questions of 2 marks has been provided.
8. Draw neat figures wherever required.

#### SECTION-A

1. If PA and PB are tangents to the circle with centre O such that  $\angle APB = 40^\circ$ , then  $\angle OAB$  is equal to



- (a)  $40^\circ$                       (b)  $30^\circ$                       (c)  $20^\circ$                       (d)  $25^\circ$
2. If the coordinates of one end of a diameter of a circle are (2, 3) and the coordinates its centre are (-2, 5), then the coordinates of the other end of the diameter are  
(a) (0, 8)                      (b) (0, 4)                      (c) (6, -7)                      (d) (-6, 7)
  3. AOBC is a rectangle whose three vertices are vertices A (0,3), O (0,0) and B (5,0). The length of its diagonal is  
(a) 5                              (b) 3                              (c)  $\sqrt{34}$                       (d) 4
  4. A bag has 5 white marbles, 8 red marbles and 4 purple marbles. If we take a marble randomly, then what is the probability of not getting purple marble?  
(a) 0.5                              (b) 0.66                              (c) 0.08                              (d) 0.77
  5. In which ratio the y-axis divides the line segment joining the point (5, -6) and (-1, -4)?  
(a) 1:5                              (b) 5:1                              (c) 1:1                              (d) 1:2
  6. If the lines  $3x + 2ky - 2 = 0$  and  $2x + 5y + 1 = 0$  are parallel, then what is the value of k?  
(a)  $\frac{4}{15}$                               (b)  $\frac{15}{4}$                               (c)  $\frac{4}{5}$                               (d)  $\frac{5}{4}$
  7. The distance between the points (3, -2) and (-3, 2) is:

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- (a) 40                      (b)  $4\sqrt{10}$                       (c)  $2\sqrt{10}$                       (d)  $\sqrt{52}$
8. If the LCM of 12 and 42 is  $10m + 4$ , then the value of m is:  
(a) 50                      (b) 8                      (c)  $\frac{1}{5}$                       (d) 1
9. The relation between mean, mode and median is  
(a) mode =  $3\text{mean} - 2\text{median}$                       (b) mode =  $3\text{median} - 2\text{mean}$   
(c) mean =  $3\text{median} - 2\text{mode}$                       (d) median =  $3\text{mean} - 2\text{mode}$
10. A sphere of diameter 18 cm is dropped into a cylindrical vessel of diameter 36 cm, partly filled with water. If the sphere is completely submerged then the water level rises by  
(a) 4 cm                      (b) 5 cm                      (c) 3 cm                      (d) 6 cm
11. One card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a black face card?  
(a)  $\frac{3}{13}$                       (b)  $\frac{3}{14}$                       (c)  $\frac{3}{26}$                       (d)  $\frac{1}{26}$
12. The roots of quadratic equation  $2x^2 + x + 4 = 0$  are:  
(a) Positive and negative                      (b) Both Positive                      (c) Both Negative                      (d) No real roots
13. If  $\sin A = \frac{1}{2}$ , then the value of  $\sec A$  is:  
(a)  $\sqrt{52}/2$                       (b)  $1/\sqrt{3}$                       (c)  $\sqrt{3}$                       (d) 1
14. In  $\Delta ABC$ , right-angled at B,  $AC = 25$  cm,  $BC = 7$  cm. The value of  $\tan C$  is:  
(a)  $\frac{12}{7}$                       (b)  $\frac{24}{7}$                       (c)  $\frac{20}{7}$                       (d)  $\frac{7}{24}$
15. HCF of  $(23 \times 32 \times 5)$ ,  $(22 \times 33 \times 52)$  and  $(24 \times 3 \times 53 \times 7)$  is  
(a) 60                      (b) 48                      (c) 30                      (d) 105
16. If the equation  $9x^2 + 6kx + 4 = 0$  has equal roots then  $k = ?$   
(a) -2 or 0                      (b) 0 only                      (c) 2 or 0                      (d) 2 or -2
17. The angle of depression of a car, standing on the ground, from the top of a 75 m tower, is  $30^\circ$ . The distance of the car from the base of the tower (in meters) is  
(a)  $25\sqrt{3}$                       (b)  $75\sqrt{3}$                       (c) 150                      (d)  $50\sqrt{3}$
18. If one equation of a pair of dependent linear equations is  $-3x + 5y - 2 = 0$ . The second equation will be:  
(a)  $-6x + 10y - 4 = 0$                       (b)  $6x - 10y - 4 = 0$   
(c)  $6x + 10y - 4 = 0$                       (d)  $-6x + 10y + 4 = 0$

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MM:80

**Direction: In the question number 19 & 20, A statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.**

19. Assertion (A): L.C.M and H.C.F of a and 20 are 100 and 10 respectively, then  $a = 50$ .  
Reason (R):  $L.C.M \times H.C.F = \text{First number} \times \text{Second number}$   
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).  
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).  
(c) Assertion (A) is true but Reason (R) is false.  
(d) Assertion (A) is false but Reason (R) is true.
20. Assertion (A): If two triangles are similar and have an equal area, then they are congruent.  
Reason (R): Corresponding sides of two triangles are equal, then triangles are congruent.  
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).  
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).  
(c) Assertion (A) is true but Reason (R) is false.  
(d) Assertion (A) is false but Reason (R) is true.

### **SECTION-B**

21. For what values of k will the following pair of linear equations have infinitely many solutions?  
$$kx + 3y - (k - 3) = 0$$
$$12x + ky - k = 0$$
22. Find the zeros of the following polynomial:  
$$5\sqrt{5}x^2 + 30x + 8\sqrt{5}$$
23. Two coins are tossed simultaneously. What is the probability of getting  
(i) At the least one head?  
(ii) At most one tail?
24. Two concentric circles are of radii 6.5 cm and 2.5 cm. Find the length of the chord of the larger circle which touches the smaller circle.

**OR**

From an external point P, tangents PA and PB are drawn to a circle with center O. If CD is the tangent to the circle at a point E and  $PA = 14$  cm, find the perimeter of  $\Delta PCD$ .

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MM:80

25. Find all possible values of  $y$  for which the distance between the points A (2, -3) and B (10,  $y$ ) is 10 units.

**OR**

In what ratio does the point P (2, 5) divide the join of A (8, 2) and B (-6, 9)?

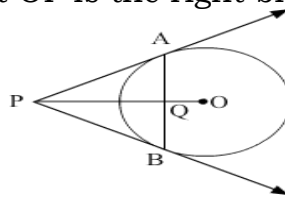
#### SECTION-C

26. Prove that  $(\operatorname{cosec} A - \sin A)(\sec A - \cos A)(\tan A + \cot A) = 1$
27. A part of monthly hostel charges in a college are fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 25 days, he has to pay Rs. 4550 as hostel charges whereas a student B, who takes food for 30 days, pays Rs. 5200 as hostel charges. Find the fixed charges and the cost of the food pay day.
28. Prove that  $\sqrt{5}$  is an irrational number.

**OR**

If two positive integers  $p$  and  $q$  are written as  $p = a^2b^3$  and  $q = a^3b$   $a$  and  $b$  are prime number then. Verify  $LCM(p, q) \times HCF(p, q) = p \times q$

29. The angle of elevation of an airplane from a point A on the ground is  $60^\circ$  after a flight of 30 seconds, the angle of elevation changes to  $30^\circ$ . If the plane is flying at a constant height of  $3600\sqrt{3}$  m, find the speed, in km/hour, of the plane.
30. In the given figure, PA and PB are two tangents drawn from an external point P to a circle with centre O. Prove that OP is the right bisector of line segment AB.



**OR**

A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Saritha paid Rs. 27 for a book kept for seven days, while Susy paid Rs. 21 for the book she kept for five days. Find the fixed charge and the charge for each extra day.

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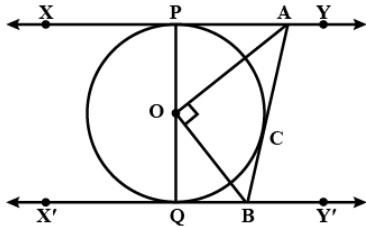
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### SUBJECT-MATHEMATICS

TIME-3HR.

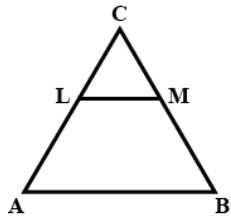
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31. In the figure XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B prove that  $\angle AOB = 90^\circ$ .



**OR**

In the given figure  $LM \parallel AB$ . If  $AL = x - 3$ ,  $AC = 2x$ ,  $BM = x - 2$  and  $BC = 2x + 3$ , find the value of  $x$



#### SECTION-D

32. Solve for  $x$ :  $\frac{1}{(2a+b+2x)} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$  ( $a, b \neq 0$ )

**OR**

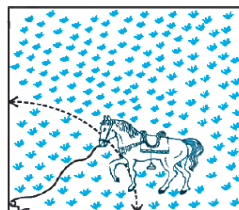
A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

33. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.

**OR**

Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non-parallel sides in the same ratio.

34. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope (see Fig). Find



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MM:80

- (i) the area of that part of the field in which the horse can graze.  
(ii) the increase in the grazing area if the rope were 10 m long instead of 5 m.  
(Use  $\pi = 3.14$ )

**OR**

Find the area of the major segment APB, in the figure of a circle of radius 35 cm and  $\angle AOB = 90^\circ$ . (Use  $\pi = \frac{22}{7}$ )

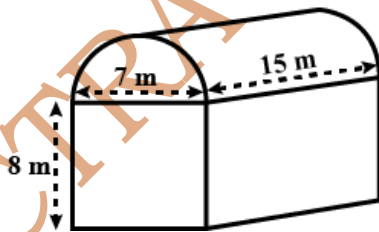
35. A life insurance agent found the following data for the distribution of ages of 100 policy holders. Calculate the median age, if policies are only given to persons having age 18 years on wards but less than 60 years.

Age in years	Number of policy holders
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	92
Below 55	98
Below 60	100

#### Section-E

#### (Case Study Based Questions)

36. Shanta runs an industry in a shed that was in the shape of a cuboid surmounted by half-cylinder. If the base of the shed is 7 m  $\times$  15 m and height of the cuboidal portion is 8 m.



- (i) find the volume of the air that the shed can hold.  
(ii) If the industry requires machinery which would occupy a total space of 300 m<sup>3</sup>, and there are 20 workers each of whom would occupy 0.08 m<sup>3</sup> space on an average, how much air would be in the shed when it is working. (Use  $\pi = \frac{22}{7}$ )  
(iii) Find the surface area of the cuboidal part of cuboidal part and cylindrical part.

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37. Deepa has to buy a scooty. She can buy scooty either making a cash down payment of Rs 25,000 or by making 15 monthly instalment as below.

First Month	Rs 3425
Second Month	Rs 3225
Third Month	Rs 3025
Fourth Month	Rs 2825

- (i) Find the amount of the 6th installment.  
(ii) Find the total amount paid in 15 instalments.

**OR**

If Deepa pays Rs. 2625 then find the number of instalments.

- (ii) Deepa paid 10<sup>th</sup> and 11<sup>th</sup> the instalment together find the amount paid that month.
38. It is common that Governments revise travel fares from time to time based on various factors such as inflation (a general increase in prices and fall in the purchasing value of money) on different types of vehicles like auto, Rickshaws, taxis, Radio cab etc. The auto charges in a city comprise of a fixed charge together with the charge for the distance covered. Study the following situations:



Name of the city	Distance travelled (Km)	Amount paid (Rs.)
City A	10	75
	15	110
City B	8	91
	14	145

**Situation 1:** In city A, for a journey of 10 km, the charge paid is Rs 75 and for a journey of 15 km, the charge paid is Rs 110.

**Situation 2:** In a city B, for a journey of 8km, the charge paid is Rs91 and for a journey of 14km, the charge paid is Rs 145.

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**Refer situation 1**

1. **If the fixed charges of auto rickshaw be Rs  $x$  and the running charges be Rs  $y$  km/hr, the pair of linear equations representing the situation is**
- a)  $x + 10y = 110, x + 15y = 75$                       b)  $x + 10y = 75, x + 15y = 110$   
c)  $10x + y = 110, 15x + y = 75$                       d)  $10x + y = 75, 15x + y = 110$
2. **A person travels a distance of 50 km. The amount he has to pay is**  
a) Rs.155    b) Rs.255    c) Rs.355    d) Rs.455

**Refer situation 2**

3. **What will a person have to pay for travelling a distance of 30km?**  
a) Rs.185    b) Rs.289    c) Rs.275    d) Rs.305

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