

# Central Board of Secondary Education

(CBSE)

Board Examination - (March)

Series : EPB20

Set

**B**

Code No. - M -041

Roll No. 

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Candidates must write the code on the title page of the answer-book.

- Please check that this question paper contains 5 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 30 questions.
- Please write down the Serial Number of the question before attempting it.

## FINAL EXAMINATION

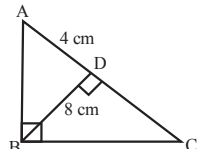
## MATHEMATICS

Time allowed : 3 hours

Maximum Marks : 80

### General Instructions :

- (a) All the questions are compulsory.
- (b) The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
- (c) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
- (d) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- (e) Use of calculators is not permitted.

<p style="text-align: center;"><b>Section - A</b> <b>Q.Nos. 1 to 20 carry 1 mark each.</b></p>	
	<p><b>Q.No. 1 to 10 are multiple choice questions. Select the most appropriate answer from the given options.</b></p>
1)	<p>The point on X-axis equidistant from points <math>A(2, 4)</math> and <math>B(-4, 8)</math> is            (a) <math>(-5, 0)</math> (b) <math>(5, 0)</math> (c) <math>(0, 0)</math> (d) None of these (1)</p>
2)	<p>Out of the following irrationals, which has sum and product both rationals ?            (a) <math>\sqrt{3} + 5</math> and <math>\sqrt{3} - 5</math> (b) <math>\sqrt{3} + \sqrt{5}</math> and <math>\sqrt{3} - \sqrt{5}</math> (c) <math>5 + \sqrt{3}</math> and <math>5 - \sqrt{3}</math> (d) All of these (1)</p>
3)	<p>In the given figure, <math>\angle ABC = 90^\circ</math> and <math>BD \perp AC</math>.            If <math>BD = 8</math> cm and <math>AD = 4</math> cm,            then find the value of <math>CD</math> is            (a) 4 cm (b) 2 cm (c) 8 cm (d) 16 cm (1)</p> 
4)	<p>Value of <math>\tan 5^\circ \tan 10^\circ \tan 45^\circ \tan 80^\circ \tan 85^\circ</math> is            (a) 0 (b) 1 (c) 2 (d) 3 (1)</p>
5)	<p>The pair of linear equation <math>x + 2y = 5</math> and <math>3x + 12y = 10</math> has            (a) unique solution (b) no solution            (c) more than two solutions (d) Infinitely many solutions (1)</p>
6)	<p>Distance between two parallel tangents of a circle of radius 3 cm is            (a) 4 cm (b) 5 cm (c) 6 cm (d) 8 cm (1)</p>
7)	<p>Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their foot is 12 m, the distance between their tops is            (a) 12 m (b) 14 m (c) 13 m (d) 11 m (1)</p>
8)	<p>If <math>(3, 2)</math>, <math>\left(x, \frac{22}{5}\right)</math> and <math>(8, 8)</math> lie on a line, then <math>x</math> equals to            (a) 5 (b) 10 (c) 15 (d) 20 (1)</p>
9)	<p>If the <math>n</math>th term of an AP is <math>3n - 8</math>, its 16th term is            (a) 20 (b) 30 (c) 40 (d) 50 (1)</p>
10)	<p>If the sum of the square of the zeroes of the polynomial <math>p(x) = x^2 + 7x + k</math> is 25, then <math>k</math> is equal to            (a) 12 (b) 49 (c) -24 (d) -12 (1)</p>
11)	<p><b>Q.No. 11 to 15 : Fill in the blanks.</b>            _____ of a class is the frequency obtained by adding the frequencies of all the classes preceding the given class. (1)</p>
12)	<p>In cubic polynomial, the maximum number of zeroes are _____. (1)</p>
13)	<p>Area of sector of a circle with radius <math>r</math> and angle measure <math>\theta</math> is _____. (1)</p>
14)	<p>If the graph of a quadratic polynomial does not intersect the X-axis, then the number of zero is _____. (1)</p>
15)	<p>In throwing of a die, the probability of getting a multiple of 7 is _____. (1)</p>
16)	<p><b>Q.No. 16 to 20 : Solve the following.</b>            The values of remainder <math>r</math>, when a positive integer <math>a</math>, is divided by 3, are 0 and 1 only. Is this statement true or false ? (1)</p>

17)	Take a point $O$ on the plane of the paper. With $O$ as centre draw a circle of radius 3 cm. Take a point $P$ on this circle and draw a tangent at $P$ . (1)																		
18)	Given that $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$ what is value of $\alpha + \beta$ ? (1)																		
19)	Find the distance between the two points $(0, 0)$ and $(a \cos \theta, a \sin \theta)$ (1)																		
20)	Find the smallest number by which $\frac{891}{3500}$ must be multiplied to make it a terminating decimal. (1)																		
	<div>Section - B</div> <div>Q.Nos. 21 to 26 carry 2 marks each.</div>																		
21)	In $\triangle OPQ$ right angled at $P$ , $OP = 7$ cm, $OQ - PQ = 1$ cm. Determine the values of $\sin Q$ and $\cos Q$ . (2)																		
22)	If one of the zeroes of the quadratic polynomial $f(x) = 4x^2 - 8kx - 9$ is equal in magnitude but opposite in sign of the other, then find the value of $k$ . (2)																		
23)	<div>The circumference of a circle exceeds the diameter by 16.8 cm. Find the radius of the circle.</div> <div>OR</div> <div>If the perimeter of a semi-circular protractor is 108 cm, find the diameter of the protractor. (Take <math>\pi = 22/7</math>)</div> (2)																		
24)	<div>The following distribution gives the statewise teacher ratio in higher secondary schools of India. Find the mode of the data :</div> <table><tr><td>Number of Students per teacher</td><td>15 - 20</td><td>20 - 25</td><td>25 - 30</td><td>30 - 35</td><td>35 - 40</td><td>40 - 45</td><td>45 - 50</td><td>50 - 55</td></tr><tr><td>Number of states</td><td>3</td><td>8</td><td>9</td><td>10</td><td>3</td><td>0</td><td>0</td><td>2</td></tr></table> (2)	Number of Students per teacher	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	Number of states	3	8	9	10	3	0	0	2
Number of Students per teacher	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55											
Number of states	3	8	9	10	3	0	0	2											
25)	<div><math>D</math> is a point on the side <math>BC</math> of <math>\triangle ABC</math> such that <math>\angle ADC = \angle BAC</math>. Prove that <math>\frac{CA}{CD} = \frac{CB}{CA}</math> or, <math>CA^2 = CB \times CD</math>.</div>																		
26)	<div>A circle touches all the four sides of a quadrilateral <math>ABCD</math>. Prove that : <math>AB + CD = BC + DA</math>.</div> <div>OR</div> <div><math>PA</math> and <math>PB</math> are tangents from <math>P</math> to the circle with centre <math>O</math>. At point <math>M</math>, a tangent is drawn cutting <math>PA</math> at <math>K</math> and <math>PB</math> at <math>N</math>. Prove that <math>KN = AK + BN</math>.</div> (2)																		
	<div>Section - C</div> <div>Q.Nos. 27 to 34 carry 3 marks each</div>																		
27)	Solve the quadratic equation : $\frac{x+3}{x-2} - \frac{1-x}{x} = \frac{17}{4}$ by factorisation method. (3)																		
28)	If the HCF of 210 and 55 is expressible in the form $210x + 55y$ , find $y$ .																		
29)	<div>Find the length of the median drawn through <math>A</math> on <math>BC</math> of a <math>\triangle ABC</math>, whose vertices are <math>A(7, -3)</math>, <math>B(5, 3)</math> and <math>C(3, -1)</math> and also find the distance of the point <math>A(7, -3)</math> from the origin.</div> <div>OR</div> <div>Find the centre of a circle passing through the points <math>(6, -6)</math>, <math>(3, -7)</math> and <math>(3, 3)</math>.</div> (3)																		
30)	Prove that : $\frac{\sin \theta}{1 - \cos \theta} = \operatorname{cosec} \theta + \cot \theta$ (3)																		

31)	From a well-shuffled deck of 52 cards, one card is drawn. Find the probability that the card drawn is (a) a queen of black colour.      (b) a card with number 5 or 6      (c) a card with number less than 8.      (3)																		
32)	For what value of $k$ , will the following system of equations have infinitely many solutions ? $2x + 3y = 4$ , $(k + 2)x + 6y = 3k + 2$ <div style="text-align: right;"><b>OR</b>      (3)</div> The sum of a two digit number and the number obtained by reversing the order of its digits is 121, and the two digits differ by 3. Find the number.																		
33)	A right circular cone is of height 8.4 cm and the radius of its base is 2.1 cm. It is melted and recast into a sphere. Find the radius of the sphere.      (3)																		
34)	A sum of ₹ 280 is to be used to award four prizes. If each prize after the first is ₹ 20 less than its preceding prize, find the value of each of the prizes.      (3)																		
	<div style="text-align: center;"><b>Section - D</b> <b>Q.Nos. 35 to 40 carry 4 marks each</b></div>																		
35)	A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter : the diameter of the spherical part is 8.5 cm. By measuring the amount of water it holds, a child finds its volume to be $345 \text{ cm}^3$ . Check whether she is correct, taking the above as the inside measurements and $\pi = 3.14$ . <div style="text-align: right;"><b>OR</b>      (4)</div> Rasheed got a playing top (lattu) as his birthday present, which sur-prisingly has no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere. The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour. $\left( \text{Take } \pi = \frac{22}{7} \right)$																		
36)	Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of $60^\circ$ .      (4)																		
37)	The shadow of a flag-staff is three times as long as the shadow of the flag-staff when the sun rays meet the ground at an angle of $60^\circ$ . Find the angle between the sun rays and the ground at the time of longer shadow. <div style="text-align: right;"><b>OR</b>      (4)</div> An aeroplane at an altitude of 200 metres observes the angles of depression of opposite points on the two banks of a river to be $45^\circ$ and $60^\circ$ . Find the width of the river.																		
38)	8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one man alone and that by one boy alone to finish the work.      (4)																		
39)	In an equilateral triangle $ABC$ the side $BC$ is trisected at $D$ . Prove that $9AD^2 = 7AB^2$ . <div style="text-align: right;"><b>OR</b>      (4)</div> A point $O$ in the interior of a rectangle $ABCD$ is joined with each of the vertices $A, B, C$ and $D$ . Prove that $OB^2 + OD^2 = OC^2 + OA^2$ .																		
40)	The following table gives the height of trees : <table border="1" style="margin-left: auto; margin-right: auto;"><tr><td>Height (Less than)</td><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td><td>42</td><td>49</td><td>56</td></tr><tr><td>Number of trees</td><td>26</td><td>57</td><td>92</td><td>134</td><td>216</td><td>287</td><td>341</td><td>360</td></tr></table> Draw 'less than ogive' and 'more than ogive'. Also, find the median.      (4)	Height (Less than)	7	14	21	28	35	42	49	56	Number of trees	26	57	92	134	216	287	341	360
Height (Less than)	7	14	21	28	35	42	49	56											
Number of trees	26	57	92	134	216	287	341	360											

~0~0~0~ Best of Luck ~0~0~0~