

AIR FORCE SCHOOLS
PRE-BOARD EXAMINATION: 2018-19
CLASS – X

Roll No.

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- Please check that this question paper contains **05** pages.
- Please check that this question paper contains **30** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed at 8.30 a. m. From 8.30 a.m. to 8.45 a.m., the students will read the question paper only and will not write any answer on the answer script during this period.

MATHEMATICS

Time allowed : 3 hours

Maximum marks : 80

General instructions:

- (i) **All questions are compulsory.**
- (ii) **This question paper consists of 30 questions divided into four sections – A, B, C and D.**
- (iii) **Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.**
- (iv) **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, four 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.**
- (v) **Use of calculator is not permitted**

SECTION – A

Question numbers 1 to 6 carry 1 mark each.

1. Find the discriminant of the quadratic equation $4\sqrt{2}x^2 + 8x + 2\sqrt{2} = 0$.

OR

If the sum and product of the roots of the quadratic equation $ax^2 - 5x + c = 0$ are both equal to 10, then find the values of 'a' and 'c'.

2. What are the possible values of remainder r , when a positive integer p is divided by 3?
3. For what value of k : $2k, (k + 10)$ and $(3k + 2)$ are in A.P.?
4. Find the area of triangle with vertices $(0, 0)$, $(4, 0)$ and $(0, 5)$.
5. A pole 6m high casts a shadow $2\sqrt{3}$ m long on the ground. Find the angle of elevation of sun.

OR

If ΔABC is right angled at C , then find the value of $\cos(A + B)$.

6. If the ratio of the perimeters of two similar triangles is 4 : 25, then find the ratio of the areas of the similar triangles.

SECTION – B

Question numbers 7 to 12 carry 2 marks each.

7. Can the number 4^n , n being a natural number, end with the digit 0? Give reason

OR

Explain why $7 \times 6 \times 5 \times 4 + 5$ is a composite number.

8. Find the value of k for which the lines $(k + 1)x + 3ky + 15 = 0$ and $5x + ky + 5 = 0$ are coincident.
9. The sum of first n terms of an A.P. is $3n^2 + 6n$. Find the n th term of this A.P.

OR

How many terms of the A.P. 18, 16, 14,..... be taken so that their sum is zero?

10. Find the ratio in which the point $(-3, p)$ divides the line segment joining the points $(-5, -4)$ and $(-2, 3)$
11. Two unbiased coins are tossed simultaneously. Find the probability of getting
(i) at least one head

- (ii) at most one head
12. A letter is chosen at random from the word 'MATHEMATICS'. Find the probability that the letter chosen is a
- (i) vowel.
- (ii) consonant.

SECTION – C

Question numbers 13 to 22 carry 3 marks each.

13. Given that $\sqrt{5}$ is irrational, prove that $2 + \sqrt{5}$ is an irrational number.
14. Obtain other zeros of the polynomial $4x^4 + x^3 - 72x^2 - 18x$, if two of its zeros are $3\sqrt{2}$ and $-3\sqrt{2}$.
15. If the points $A(-2, 1)$, $B(a, b)$ and $C(4, -1)$ are collinear and $a - b = 1$, find the values of a and b .

OR

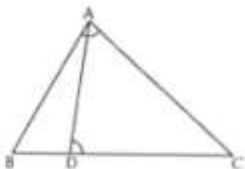
The vertices of ΔABC are $A(-2, 0)$, $B(2, 0)$ and $C(0, 2)$ and that of ΔDEF are $D(-4, 0)$, $E(4, 0)$ and $F(0, 4)$. Prove that $\Delta ABC \sim \Delta DEF$.

16. Solve the following system of equations graphically :

$$x + 3y = 6$$

$$2x - 3y = 12$$

17.



In given figure, D is a point on the side BC of ΔABC such that $\angle BAC = \angle ADC$.

Prove that

$$CA^2 = CB \times CD.$$

OR

Show that, in a trapezium any line drawn parallel to the parallel sides of trapezium, to intersect non parallel sides, divides them proportionally.

$\frac{p-2q}{2}$ is a rational number and $\sqrt{5}$ is an irrational number

1

So our supposition is wrong

$2 + \sqrt{5}$ is an irrational number

$\frac{1}{2}$

14. $p(x) = 4x^4 + x^3 - 72x^2 - 18x$

As $3\sqrt{2}$ and $-3\sqrt{2}$ are its zeros)

So $(x - 3\sqrt{2})$ and $(x + 3\sqrt{2})$ are its factors

Or $(x - 3\sqrt{2})(x + 3\sqrt{2})$ is its factor

Or $x^2 - 18$ is factor.

1

$$p(x) = (x^2 - 18)q(x)$$

$$q(x) = 4x^2 + x$$

$1\frac{1}{2}$

$$= x(4x + 1)$$

Other zeros are 0 and $-\frac{1}{4}$

$\frac{1}{2}$

15. As A, B and C are collinear

$$\ar(\Delta ABC) = 0$$

$$\frac{1}{2} |-2(b+1) + a(-1-1) + 4(1-b)| = 0$$

$$a + 3b = 1$$

$1\frac{1}{2}$

$$\text{also } a - b = 1$$

$$\text{we get } b = 0 \text{ and } a = 1$$

$1\frac{1}{2}$

OR

$$AB = \sqrt{(2+2)^2} = 4$$

$$BC = \sqrt{4+4} = 2\sqrt{2}$$

$$AC = \sqrt{4+4} = 2\sqrt{2}$$

1

$$DE = \sqrt{8^2} = 8$$

$$EF = \sqrt{4^2 + 4^2} = 4\sqrt{2}$$

$$DF = \sqrt{4^2 + 4^2} = 4\sqrt{2}$$

1

$$\text{So } \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{1}{2}$$

So $\Delta ABC \sim \Delta DEF$ (s. s. s.)

1

Seven years ago Varun's age was five times the square of Swati's age. Three years hence, Swati's age will be $\left(\frac{2}{5}\right)^{\text{th}}$ of Varun's age. Find their present ages.

24. Which term of the sequence $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$ is first negative term?
25. Prove that the ratio of the areas of two similar triangles is same as the square of the ratio of their corresponding sides.

OR

State and prove Pythagoras theorem.

26. Draw a triangle whose sides are of lengths 3 cm., 4 cm. and 5 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.
27. Prove that $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$
28. A man is standing on the deck of a ship, which is 10m above water level. He observes the angle of elevation of the top of a hill as 60° and angle of depression of the base of the hill as 30° . Calculate the distance of the hill from the ship. Also find the height of the hill.
29. A bucket is in the form of a frustum of a cone and holds 28.490 liters of water. The radii of top and bottom are 28 cm. and 21 cm. respectively. Find the height of the bucket.
30. 50 students enter for school javelin throw competition. The distances (in meters) are recorded below:

Distance:	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
No. of students:	6	11	17	12	4

Draw a less than type ogive for the above data.

OR

The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight (in kg)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75
Number of students	2	3	8	6	6	3	2