# PRINCE PUBLIC SCHOOL
# HALF YEARLY EXAMINATION (2018-19)
# SAMPLE PAPER - 1
# MATHEMATICS
# X

**TIME ALLOWED: 3 HOURS** **MAXIMUM MARKS: 80**

**General Instructions.**

1. **This question paper consists of 30 questions.**
2. **All questions are compulsory.**
3. **Question 1-6in Section A are very short answer type questions carrying 1 mark each.**
4. **Question 7-12 in Section B are short answer type - I questions carrying 2 marks each.**
5. **Question 13-23 in Section C are short answer type-II questions carrying 3 marks each.**
6. **Question 24-28 in Section D are long answer type questions carrying 4 marks each.**
7. **There is no overall choice. However, internal choice has been provided. You have to attempt only one of the alternatives in all such questions.**
8. **Use of calculators is not allowed.**

## SECTION- A

**Q1.** If $sin$A + $sin^2$A= 1, then what is the value of $cos^2$A + $cos^4$ A ?

**Q2.** If $\sum fi = 11$, $\sum fixi = 2p + 52$ and the mean of any distribution is 6, find the value of $p$.

**Q3.** If $a$ and $b$ are two positive integers such that the least prime factor of $a$ is 3 and the least prime factor of $b$ is 5, then calculate the least prime factor of $a + b$.

**Q4.** Find whether the following pair of equations has no solution, unique solution or infinitely many solution.

$$5x - 8y + 1 = 0\,; \qquad 3x - \frac{24}{5}y + \frac{3}{5} = 0$$

**Q5.** If one of the zeroes of the quadratic polynomial $(k-1)x^2$+ $kx$+ 1 is -3, then what is the value of $k$?

**Q6**. Find the value of $k$, for which one root of the quadratic equation $kx^2 - 14x + 8 = 0$ is six times the other.

## SECTION –B

**Q7.** Use Euclid's division lemma to show the cube of any positive integer is of the form 9m, 9m +1 or 9m + 8.

**Q8.** If 5tan$\theta$ = 4, find the value of $\frac{5\,sin\theta - 3\cos\theta}{5\,sin\theta + 2\cos\theta}$ .

**Q9.** Divide $ax^2 + (b + ac)x$ by $x + c$.

**Q10.** If $\alpha, \beta$ and $\gamma$ are zeroes of the polynomial f(x) = p$x^3$+ q$x^2$+ r$x$+ s, then find the value of $\alpha^2$+ $\beta^2$+ $\gamma^2$.

**Q11.** If $-5$ is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of $k$.

**Q12.** A game consists of tossing a one-rupee coin 3 times and noting the outcome each time. Ramesh will win the game if all the tosses show the same result (either all three heads or all three tails) and loses the game otherwise. Find the probability that Ramesh will lose the game.

## SECTION –C

**Q13.** A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

**Q14.** The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditure is 4 : 3. If each of them manages to save ` 2000 per month, find their monthly incomes.

**Q15.** Prove that $\frac{cos(90° - \theta)}{1+sin(90° - \theta)} + \frac{1+sin(90° - \theta)}{cos(90° - \theta)}$ = 2cosec$\theta$.

**Q16.** Prove that one of every three consecutive integers is divisible by 3.

**Q17.** In fig. 1, $\Delta FEC \cong \Delta GBD$ and $\angle 1 = \angle 2$. Prove that $\Delta ADE \sim \Delta ABC$.

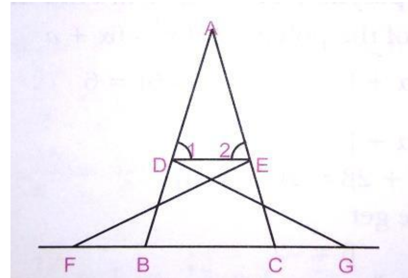


fig. 1

**Q18.** Find the missing frequencies in the following frequency distribution table, if N = 100 and median is 32.

| **Marks obtained** | **0 - 10** | **10 - 20** | **20 - 30** | **30 - 40** | **40 – 50** | **50 - 60** | **Total** |
|---|---|---|---|---|---|---|---|
| **Number of students** | 10 | ? | 25 | 30 | ? | 10 | 100 |

**Q19.** Varun decided to teach math to weak students in a slum school. He recorded the marks obtained by the students in their last term. The following frequency distribution gives the marks obtained by the students.

| **Marks** | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| **No. of students** | 5 | 3 | 4 | 3 | 3 | 4 | 7 | 9 | 7 | 8 |

Find the median of the data.

**Q20.** If 1 and $-1$ are zeroes of polynomial $Lx^4 - Mx^3 + Nx^2 + Rx + P = 0$, show that $\boldsymbol{L + N + P \; = \; M + R = 0}$

**Q21.** Solve for $x$ such that $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, x \neq -1, -2, -4.$

**Q22.** The arithmetic mean of the following frequency distribution is 50. Find the value of $p$.

| Class | Frequency |
|---|---|
| 0-20 | 17 |
| 20-40 | $p$ |
| 40-60 | 32 |
| 60-80 | 24 |
| 80-100 | 19 |

## SECTION- D

**Q23.** $\Delta ABC$ is a right triangle, right angled at $B$. $AD$ and $CE$ are the two medians drawn from $A$ and $C$ respectively. If $AC = 5\ cm$ and $AD = \frac{3\sqrt{5}}{2}\ cm$, find the length of $CE$.

**Q24.** If 2cos$\theta$ – sin$\theta$ = x and cos$\theta$ - 3sin$\theta$ = y then prove that 2$x^2$+$y^2$- 2xy = 5.

**Q25.** If $x + a$ is a factor of the polynomial $x^2 + px + q$ and $x^2 + mx + n$ prove that $= \frac{n-q}{m-p}$ .

**Q26.** A test consists of 'TRUE' or 'FALSE' questions. One mark is awarded for every correct answer while $\frac{1}{2}$ mark is deducted for every wrong answer. A student knew answers to some of the questions. Rest of the questions he attempted by cheating. He answered 120 questions and got 90 marks. If answer to all questions he attempted by cheating were wrong, then how many questions did he answer correctly? How the habit of cheating will affect his character building?

**Q27.** The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them.

**Q28.** Solve the given quadratic equation for $x$ such that $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$

**Q29.** Cards marked with numbers 3, 4, 5, …, 50 are placed in a bag and mixed thoroughly. One card is drawn at random from the bag. Find the probability that number on the card drawn is

**a)** divisible by 7 **b)** a perfect square **c)** a multiple of 6

**Q30.** A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears

**a)** a two-digit number **b)** a perfect square number

**c)** a number divisible by 5 **d )** a prime number