G.D. Goenka Public School, Sirsa
Holiday Engagement- 2020-21
CLASS XI - SCIENCE

ENGLISH

Dear parents and Students,
My greetings to all of you.
We have together as a team completed the innovative endeavor of digital online teaching for our children in the stressful and testing times of national lockdown during COVID-19.
I congratulate you for your patience, perseverance and support in making digital teaching learning process a success.
The students need a much awaited break to prepare themselves further to cope with the uncertainty that surrounds us due to the pandemic.

ENGLISH PROJECT TASKS:

- Research on the Egyptians civilizations –with particular reference to Tut's Mummy and its discovery. Stick pictures.
- Research on Khushwant Singh's life and works. Find out about the role of Khushwant Singh's father in building Delhi.
- Research on sailing terminology and parts of a boat and gather information about Isle Amsterdam.
- Design a poster as an appeal for maintaining social distance at the time of COVID 19 outbreak .
- Cut out 5 clippings of Classified Ads under the heads –
  - For sale
  - To-let
  - Situation vacant
  - For matrimonial
- Write 5 short stories from around the world. Also state which one is your favorite.

MATHEMATICS

XI Maths Worksheet

Chapter#4 : Principle of Mathematical Induction

Q.1	Let P (n) be the statement n(n + 1) is an even number then find P(6). (1 mark)
Q.2	Prove the following by using the principle of mathematical induction for all $n \in N$: (5 marks) $1.3+2.3^2+3.3^3+...+n.3^n=\frac{(2n-1)3^{n+1}+3}{4}$
Q.3	Prove the following by using the principle of mathematical induction for all $n \in N$: (5 marks) $1+\frac{1}{(1+2)}+\frac{1}{(1+2+3)}+...+\frac{1}{(1+2+3+...n)}=\frac{2n}{(n+1)}$
Q.4	Prove by using the principle of mathematical induction $3^{2n} - 1$ is divisible by 8 for n ∈ N. (3 marks)
Q.5	Prove the following by using the principle of mathematical induction for all $n \in N$: (3 marks) $1+3+3^2+...+3^{n-1}=\frac{(3^n-1)}{2}$
Q.6	Prove by using the principle of mathematical induction for all n∈N. $1.3 + 3.5 + 5.7 + \ldots\ldots\ldots\ldots + (2n-1)(2n+1) = \frac{n(4n^2+6n-1)}{3}$
Q.7	Prove by using the principle of mathematical induction for all nεN: $1 + 3 + 3^2 + \ldots\ldots\ldots\ldots + 3^{n-1} = \frac{3^n-1}{2}$
Q.8	Prove that the product of two consecutive natural numbers is an even number. (3 marks)
Q.9	Prove the following by using the principle of mathematical induction for all n ∈ N.(3 marks) $(2n+7) < (n+3)^2$
Q.10	Use the principle of mathematical induction to prove that 1+5+9+13+.....+(4n-3) = n(2n-1), n∈N
Q.11	Prove that : $2.7^n + 3.5^n - 5$ is divisible by 24 for all n∈N.
Q.12	Prove the following by using the principle of mathematical induction for all $n \in N$: (3 marks) $\left(1+\frac{3}{1}\right)\left(1+\frac{5}{4}\right)\left(1+\frac{7}{9}\right)...\left(1+\frac{(2n+1)}{n^2}\right)=(n+1)^2$
Q.13	Prove by using the principle of mathematical induction $3^n < 4^n$ for all n ∈ N. (3 marks)
Q.14	For every positive integer n, prove that $7^n - 3^n$ is divisible by 4.

Q.15	prove by using the principle of mathematical induction for $n \in N$: $(2n+7) < (n+3)^2$
Q.16	Prove the following by using the principle of mathematical induction for all $n \in N$: (3 marks) $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots+\frac{1}{2^n}=1-\frac{1}{2^n}$
Q.17	Suppose P(n): n(n+1)(n+2) is divisible by 6. Show that P(1), P(2) and P(3) are true. (1 mark)
Q.18	Let P(n) be the statement $n^2 > 25$, prove that whenever P(k) is true, P(k + 1) is also true.
Q.19	Let $P(n)$ be the statement "$n^2 - n + 41$is prime". Show that $P(1)$, $P(2)$, $P(3)$ are true whereas $P(41)$ is not true. (2 marks)
Q.20	Explain the principle of mathematical induction. (1 mark)

Chapter#6. Linear Inequalities

Q.1	Solve the inequality and show the graph of the solution on number line: $3(1 - x) < 2 (x + 4)$. (3 marks)
Q.2	IQ of a person is given by the formula $IQ = \frac{MA}{CA} \times 100$. Where MA is mental age and CA is chronological age. If $80 \le IQ \le 140$ for a group of 12 years old children, find the range of their mental age. (3 marks)
Q.3	In a game, a person wins if he gets the sum greater than 20 in four throws of a die. In three throws he got numbers 6, 5, 4. What should be his forth throw, so that he wins the game. (3 marks)
Q.4	Solve the inequality $-3 \le 4 - \frac{7x}{2} \le 18$. (2 marks)
Q.5	A solution is to be kept between 68°F and 77°F. What is the range in temperature in degree Celsius (C) if the Celsius/Fahrenheit (F) conversion formula is given by $f = \frac{9}{8}C + 32?$ (3 marks)
Q.6	Solve 7x + 9 30. (1 mark)
Q.7	Solve the inequality $7 \le \frac{(3x + 11)}{2} \le 11$. (2 marks)
Q.8	How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content? (5 marks)
Q.9	Solve $4x + 3 < 6x + 7$. (1 mark)
Q.10	Solve $7x + 3 < 5x + 9$. Show the graph of the solutions on number line. (2 marks)
Q.11	Solve the system of inequalities : $3x - 7 < 5+x$ $11 - 5x \le 1$ and represent the solution on the number line.
Q.12	Solve the following system of inequalities graphically: $x + y \ge 4$, $2x - y > 0$. (3 marks)
Q.13	Solve the following system of inequalities graphically: $x + 2y \le 10$, $x + y \ge 1$, $x - y \le 0$, $x \ge 0$, $y \ge 0$. (5 marks)
Q.14	Solve the following system of inequalities graphically: $2x - y > 1$, $x - 2y < -1$. (3 marks)

Q.15	To receive Grade 'A' in a course, one must obtain an average of 90 marks or more in five examinations (each of 100 marks). If Sunita's marks in first four examinations are 87, 92, 94 and 95, find minimum marks that Sunita must obtain in fifth examination to get grade 'A' in the course. (3 marks)
Q.16	A shopkeeper sells a product at a price four times more than its actual price. Find the actual price such that the shopkeeper gets a benefit of at least Rs 40. (2 marks)
Q.17	The longest side of the rectangle is five times the shortest side. If the perimeter of the rectangle is atleast 120 cm. Find the minimum value of shortest side. (3 marks)
Q.18	A solution of 8% boric acid is to be diluted by adding a 2% boric acid solution to it. The resulting mixture is to be more than 4% but less than 6% boric acid. If we have 640 litres of the 8% solution, how many litres of the 2% solution will have to be added? (5 marks)
Q.19	Solve the following system of inequalities graphically: $4x + 3y \leq 60$, $y \geq 2x$, $x \geq 3$, $x, y \geq 0$. (5 marks)
Q.20	Solve the inequalities and represent the solution graphically on number line: $5x + 1 > -24$, $5x - 1 < 24$. (2 marks)

Chapter#5. Complex Numbers and Quadratic Equations

Q.1	Solve the equation $2x^2 + x + 1 = 0$. (2 marks)
Q.2	**Evaluate :** $\left[i^{18} + \left(\frac{1}{i}\right)^{25} \right]$
Q.3	Convert the given complex number in polar form: -3. (3 marks)
Q.4	Express the given complex number in the form $a + ib$: $(1 - i) - (-1 + i6)$. (1 mark)
Q.5	**Express** $\left(-\sqrt{3} + \sqrt{-2}\right)\left(2\sqrt{3} - i\right)$ **in the form a+ib.**
Q.6	Evaluate: $\left(-\sqrt{-1}\right)^{4n+3}$. (1 mark)
Q.7	Express the given complex number in the form $a + ib$: $\left(\frac{1}{3} + 3i\right)^3$. (3 marks)
Q.8	Find the multiplicative inverse of the complex number $\sqrt{5} + 3i$. (2 marks)
Q.9	Express the given complex number in the form $a + ib$: $(1 - i)^4$. (2 marks)
Q.10	Find the multiplicative inverse of the complex number $-i$. (1 mark)
Q.11	If $x - iy = \sqrt{\frac{a - ib}{c - id}}$, then prove that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$ (5 marks)
Q.12	**Convert the complex number** $z = \frac{i - 1}{\cos\frac{\pi}{3} + i \sin\frac{\pi}{3}}$ **in the polar form**

Q.13 Solve : $x^2 + 2 = 0$

Q.14 Solve $4x^2 - 25i^2 = 0$. (1 mark)

Q.15 Find the argument of $1 + \sqrt{3}i$ (1 mark)

Q.16 Express $\left[\left(\frac{1}{3} + i\frac{7}{3}\right) + \left(4 + i\frac{1}{3}\right)\right]$ in the form a+bi.

Q.17 Express $i^9 + i^{10} + i^{11} + i^{12}$ in the form a + bi.

Q.18 Express : $i^9 + i^{19}$ in the form a+bi.

Q.19 Solve the quadratic equation $25x^2 - 30x + 11 = 0$. (2 marks)

Q.20 Write the conjugate of complex number -5 + 3i. (1 mark)

Physics

1. If Velocity acceleration (A) and force (F) are taken as fundamental quantities instead of mass (M), length (L) and time (T), the dimensions of Young's modulus of elasticity would be M, L and T as fundamental, [Young's modulus] = $ML^{-1}T^{-2}$

   (a) FA^2V^{-2} (b) FA^2V^{-3} (c) FA^2V^{-4} (d) FA^2V^{-5}

2. The dimensional formula for latent heat is

   (a) $M^\circ L^2T^{-2}$ (b) MLT^{-2} (c) ML^2T^{-2} (d) ML^2T^{-1}

3. The result after adding 3.8×10^{-6} with 4.2×10^{-5} with due regard to significant figure is

   (a) 4.58×10^{-5} (b) 0.458×10^{-4} (c) 4.6×10^{-5} (d) 45.8×10^{-6}

4. The volume of a sphere is 1.76 cm^3. The volume of 25 such spheres taking into account the significant figure is

   (a) $0.44 \times 102\ cm^3$ (b) $44.0\ cm^3$ (c) $44\ cm^3$ (d) $44.00\ cm^3$

5. Which of the following has not been expressed in proper units? [stress = force /Area, surface tension = force/length]

   (a) stress/strain = N/m^2 (b) surface tension = N/m

   (c) energy = kg × m/s (d) pressure = N/m^2

6. Suppose the acceleration due to gravity at a place is 10 m/s^2. Its value in $cm/(minute)^2$ is

   (a) 36×10^5 (b) 6×10^4 (c) 36×10^4 (d) none of these

7. If $x = a^n$, then fractional error $\frac{\Delta x}{x}$ is equal to

(a) $\pm \left(\frac{\Delta a}{a}\right)^n$ (b) $\pm n \left(\frac{\Delta a}{a}\right)$ (c) $\pm n \log_e \frac{\Delta a}{a}$ (d) $\pm n \log \frac{\Delta a}{a}$

8. What is the percentage error in the measurement of time period of a pendulum if maximum errors in the measurement of '*l*' and *g*' are 2% and 4% respectively?

(a) 6% (b) 4% (c) 3% (d) 5%

9. A physical quantity is represented by $X = M^a L^b T^{-c}$. If percentage error in the measurement of *M*, *L* and *T* are α%, β% and γ% respectively, then the maximum percentage error in calculating X is

(a) $(\alpha a - \beta b + \gamma c)$% (b) $(\alpha a + \beta b + \gamma c)$% (c) $(\alpha a - \beta b - \gamma c)$% (d) none of the above

10. The density of a cube is measured by measuring its mass and the length of its sides. If the maximum errors in the measurement of mass and length are 3% and 2% respectively, then the maximum error in the measurement of density is

(a) 9% (b) 7% (c) 5% (d) 1%

11. Precision in measurement depends on

(a) zero error (b) parallax

(c)least count of instrument (d) calibration of **instrument**

12. The number of significant figures in the number 0.020740×10^{-3} are

(a) 6 (b) 5 (c) 7 (d) 4

13. 0.205 – 0.2014 can be expressed as

(a) 0.0036 (b) 3.6×10^{-3} (c) 4.00×10^{-3} (d) 4×10^{-3}

14. The density of wood is 0.5 in CGS system of units. The corresponding value in MKS unit is

(a) 500 (b) 0.5 (c) 5×10^{-2} (d) 5000

15. The density of a cube is found by measuring its mass and the length of its side. If the maximum errors in the measurement of mass and length are 0.3% and 0.2% respectively, the maximum error in the measurement of density is

(a) 0.3% (b) 0.5% (c) 0.9% (d) 1.1%

16. The kinetic energy of a particle depends on the square of speed of the particle. If error in measurement of speed is 40%, the error in the measurement of kinetic energy will be

(a) 40% (b) 80% (c) 96% (d) 20%

17. The linear momentum *p* of a particle is given as a function of time *t* as $p = At^2 + Bt + C$. The dimensions of constant *B* are

(a) $M L^{-1} T^{-1}$ (b) $M L^{-1} T^{-2}$ (c) $M L T^{-2}$ (d) M L T

18. A length of 5.0×10^1 cm when converted into meter can be written as

(a) 0.5 m (b) 0.50 m (c) 5.0×10^{-1} m (d) 5.00×10^{-1} **m**

19. A dimensionless quantity *y* is represented by the formula $y = \frac{a - bc}{d + e}$. Which of following is/are correct?

(a) Dimensions of *d* are *e* are same (b) *abc* and *de* have some dimensions

(c) $\frac{bc}{ae + d}$ is dimensionless (d) *de* + *bc* is not **meaningful**

20. The radius of a spherical ball is (10.4 ± 0.4) cm. Select the correct alternative

(a) the percentage error in radius is 4% (b) the percentage error in radius is 0.4%

(c) the percentage error in volume is 12% (d) the percentage error in volume is 1.2 cm^3

21. A dimensionless quantity

(a) may have a unit (b) must have a unit

(c) may not have a unit (d) must not have a unit

22. The dimensions of the quantities in one (or more) of the following pairs are the same. Identify the pair (s)

(a) torque and work (b) angular momentum and work

(c) energy and Young's modulus (d) light year and wavelength

23. Determine the number of significant figures in the following numbers

(a) 23 cm (b) 3.589 s, (c) 4.67×10^3 m/s, (d) 0.0032 m.

24. The time period (t) of vibration of a liquid drop depends on surface tension (S), radius (R) of the drop and density (ρ) of the liquid. Find t.

25. The height h to which a liquid of density ρ and surface tension S rises in a capillary tube of radius r may depend upon ρ, σ, r and g, where g is the acceleration due to gravity. Experiments show that h is inversely proportional to r. With this experimental information, use the dimensional method to show that $h = \frac{kS}{r\rho g}$. (k is the dimensionless constant)

26. The Young's modulus of steel in the CGS system is 2.0×10^{12} dyne cm^{-2} . Express it in the SI system.

27. We measure the period of oscillation of a simple pendulum. In successive measurements, the readings turn out to be 2.63 s, 2.56s, 2.42s, 2.71s and 2.80 s. Calculate the
(a) absolute errors, (b) relative error (c) percentage error.

28. A physical quantity ρ is related to four variables α, β, γ and η as follows $\rho = \frac{\alpha^3\beta^2}{\sqrt{\gamma\eta}}$. The percentage errors of measurements in α, β, γ and η are 1%, 3%, 4% and 2 % respectively. Find the percentage errors in ρ.

29. A wire is of mass (0.3 ± 0.003)g. The radius is (0.5 ± 0.005)mm and length is (6.0 ± 0.06)cm then find the % error in density.

30. The kinetic energy of a particle moving along x-axis varies with the distance x of the particle from origin as $K = \frac{A + x^3}{B(x^{1/4}) + C}$. Write the dimensional formula for A^2B .

Note- Do all these questions in your fair notebook.