ARMY PUBLIC SCHOOL RATNUCHAK
SESSION: 2017-18
WORKSHEET

CLASS X **MATHEMATICS**

Q.1 α, β are zeroes of the quadratic polynomial $x^2 - (k + 6)x + 2(2k - 1)$. Find the values of k if $\alpha + \beta = \frac{1}{2}\alpha\beta$.

Q.2 A positive number when divided by 88 gives the remainder 8. What will be the remainder when this number is divided by 11.

Q.3 From the top of a lighthouse, 20 m above the water level, the angle of depression of a small boat is 30°. How far is the boat from the base of the lighthouse?

Q.4 The ratio of the length of a stick and its shadow is $\sqrt{3} : 1$. Find the angle of elevation of the sun.

Q.5 If $\tan B = \sqrt{2} - 1$ show that $\frac{\tan B}{1 + \tan^2 B} = \frac{\sqrt{2}}{4}$

Q.6 Prove the following identity $\cot\theta - \tan\theta = \frac{2\cos^2\theta - 1}{\sin\theta . \cos\theta}$

Q.7 If $A + B = 90^\circ$, prove that $\sqrt{\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}} = \tan A$

Q.8 Show that any positive odd integer is of the form $8q + 1$ or $8q + 3$ or $8q + 5$ or $8q + 7$ where q is some integer.

Q.9 If α,β,γ be zeroes of polynomials $6x^3+3x^2- 5x+1$, then find the value of $\alpha^{-1}+\beta^{-1}+\gamma^{-1}$

Q.10 Form a quadratic polynomial whose zeroes are $\frac{3-\sqrt{3}}{5}$ and $\frac{3+\sqrt{3}}{5}$.

Q.11 If $\tan\theta = \frac{m}{n}$, show that $\frac{m\sin\theta - n\cos\theta}{m\sin\theta + n\cos\theta} = \frac{m^2 - n^2}{m^2 + n^2}$

Q.12 The traffic lights at three different road crossings change after every 48 sec, 72 sec and 108 sec respectively. If they all changes simultaneously at 8:20:00 hours at what time will they again change simultaneously.

OR The circumference of a circular field is 360 km. Three men cycle around it at a speed of 36, 60 and 72 km per day respectively, if they start cycling on same day from same place then after how many days will they meet again at the starting point?

Q.13 In a two digit number, the sum of the digits is 9. If the digits are reversed the number is increased by 9. Find the number.

OR Solve the quadratic equation by factorization method:

$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $x \neq 0$, $a \neq 0$, $b \neq 0$ (Marks : 3)

Q.14 Solve the following system of linear equations graphically:
$2x + 3y = 9$, $x - y = 2$. Also, find the area of triangle made by these lines with y-axis. (Marks : 3)

Q.15 Draw the graph of the equations:
$4x - y = 4$ and $4x + y = 12$
Determine the vertices of the triangle formed by the lines representing these equations and the x-axis. Shade the triangular region so formed and also find area.

Q.16 Prove that $x^2 - x$ is divisible by 2 for every positive integer x.

Q.17 A, B and C starts cycling around a circular path in the same direction at same time. Circumference of the path is 360 km. If the speed of A is 40 m/min, speed of B is 60 m/min and that of C is 72 m/min and they start from the same point, then after what time interval they will be together at the starting point?

Q.18 If $x = a\sec\theta + b\tan\theta$, $y = a\tan\theta + b\sec\theta$, prove that $x^2 - y^2 = a^2 - b^2$.

Q.19 If tan = $\frac{2mn}{m^2 - n^2}$, find the value of other t – ratios.

Q.20 If one of the zeroes of the polynomial $(k^2+9)x^2+13x+6k$ is reciprocal of the other then find the value of k.

Q.21 Three sets of Science, English and Mathematics books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of Science books is 144, the number of English books is 180 and the number of Mathematics books is 192. Assuming that the books are of the same thickness, determine the number of stacks of Science, English and Mathematics books.

Q.22 If cosec θ - sin θ = ℓ and sec θ - cos θ = m, prove that $\ell^2 m^2 (\ell^2 + m^2 + 3) = 1$

Q.23 The angle of elevation of the top of a cliff from a fixed point is θ . After going up a distance of K metres towards the top of the cliff with an angle of ϕ from the same point, it is found that the angle of elevation is α. Show that the height of the cliff is equal to $\frac{K(\cos\phi - \sin\phi \cot\alpha)}{(\cot\theta - \cot\alpha)}$ metres.

Q.24 A tree is broken by the wind. The top struck the ground at an angle of 30° and at a distance of 30 metres from the root. Find the whole height of the tree (Use $\sqrt{3} = 1.73$).

Q.25 The traffic lights at three different road crossings change after every 48 sec, 72 sec and 108 sec respectively.(V) 1. If they all change simultaneously at 8:30:00 hours, at what time will they again change simultaneously? 2. Write the significance of traffic lights.

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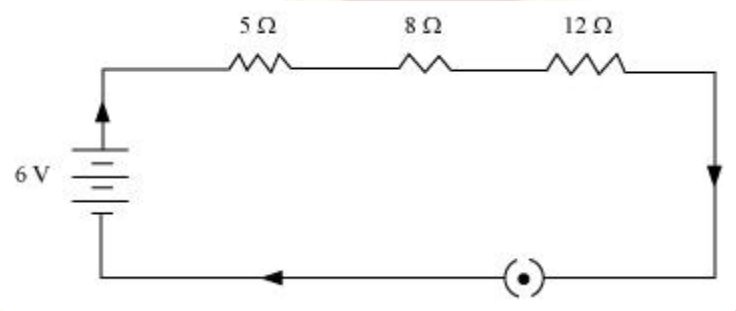
CLASS X **SCIENCE**

Q1.a) An electric geyser consumes electricity at the rate of 1000W. If the potential difference through the electric circuit is 250 V, find the resistance offered by geyser.

b) Find the electric current through the circuit.



Q2. In the following reactions name the substances which are oxidized and reduced and also mention the oxidizing and reducing agents:

(a) $3MnO_2 (s) + 4Al (s) \xrightarrow{heat} 3Mn (l) + 2Al_2$

(b) $Fe_2O_3 (s) + 3CO (g) \xrightarrow{heat} 2Fe (s) + 3CO_2 (g)$

Q3. Write balanced chemical equations for the following word equations:

A. Calcium hydroxide +Carbon dioxide Calcium carbonate +Water

Skeletal equation:_____

Balanced equation: _____

B. Zinc + Silver nitrate Zinc nitrate + Silver

Skeletal equation:_____

Balanced equation:_____

C. Reaction of acid with metal carbonate

Calcium carbonate + Hydrochloric acid Calcium chloride + Carbondioxide +Water

General equation:_____

Balanced equation:_____

D. Reaction of acid with metal hydrogen carbonate

Sodium hydrogen carbonate + hydrochloric acid

Sodium chloride +Carbon dioxide +Water

General equation:_____

Balanced equation:_____

E. Reaction of acid with metallic oxides

Magnesium oxide + Hydrochloric acid Magnesium Chloride +Water

General equation:_____

Balanced equation:_____

Q4. Balance and classify each of the following reactions as combination, decomposition, displacement or double displacement reactions:

(a) $Zn\ (s) + AgNO_3\ (aq) \longrightarrow Zn(NO_3)_2 + Ag\ (s)$

(b) $KNO_3(s)\ \xrightarrow{heat} KNO_2 + O_2\ (g)$

(c) $Ni\ (NO_3)_2\ (aq) + NaOH\ (aq) \longrightarrow Ni(OH)_2(s) + NaNO_3(aq)$

(d) $KClO_3\ (s)\ \xrightarrow{heat} KCl\ (s) + O_2\ (g)$

(e) $MgO\ (s) + C\ (s) \longrightarrow CO\ (g) + Mg\ (s)$

Q5. Ten bulbs are connected in a series circuit to a power supply line. Ten identical bulbs are connected in a parallel circuit to an identical power supply line.
1. Which circuit would have the highest voltage across each bulb
2. In which circuit would the bulbs be brighter?
3. In which circuit, if one bulb blows out, all others will stop glowing?
4. Which circuit would have less current in it?

Q6. Calculate the cost of operating a heater of 500 W for 20 hours at the rate of Rs. 3.90 per unit.

Q7. Write the formula for the following compounds:
1. Zinc Sulphate 2.Lead Nitrate. 3. Potassium Iodide .4. Calcium Carbonate.
5. Barium chloride 6. Aluminium sulphate 7. Magnesium Nitride. 8.Aluminium Oxide.
9 . Copper Sulphate 10.Aluminium Hydroxide