ARMY PUBLIC SCHOOL, DAGSHAI

CLASS IX – MATHEMATICS – Winter Break Task

Kindly solve the following questions in a note-book

1. The exterior angle of a triangle is equal to the sum of two:-
   A) Exterior angles B) Interior angles
   C) Interior opposite angles D) Alternate angles

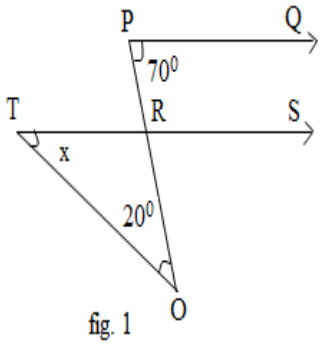

fig. 1

2. In fig. 1, PQ ∥ RS, ∠QPR = 70^0 , ∠ ROT = 20^0 , find the value of 'x':-
   A) 20^0 B) 70^0 C) 110^0 D) 50^0
3. In fig. 2, the value of 'x' is:-
   A) 40^0 B) 80^0 C) 35^0 D) 90^0
4. Ordinate of a point is negative in:-
   A) III and IV quadrant B) III quadrant only
   C) II and III quadrant D) IV quadrant only
5. Find 'x' in fig. 3
   A) 80^0 B) 40^0 C) 160^0 D) 20^0
6. Which of the following is quadratic polynomial:-
   A) x + 2 B) $x^2 + 2$ C) $x^3 + 2$ D) 2x + 2
7. The zero of the polynomial p(x) = 2x + 5 is:-
   A) $\frac{2}{5}$ B) $\frac{5}{2}$ C) $-\frac{5}{2}$ D) 0
8. The value of $\sqrt{20}$ x $\sqrt{5}$ is :-
   A) 10 B) $2\sqrt{5}$ C) $20\sqrt{5}$ D) $4\sqrt{5}$
9. Euclid stated that all right angles are equal to each other in the form of :-
   A) An axiom B) a definition C) a postulate D) a proof

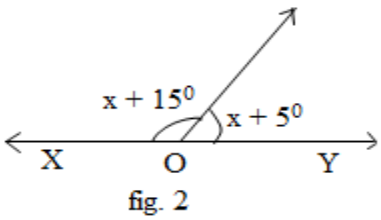

fig. 2

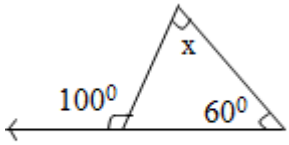

fig. 3

10. Simplify :- $\frac{13^{\frac{1}{5}}}{13^{\frac{1}{3}}}$
    A) $(13)^{\frac{1}{5}}$ B) $(13)^{\frac{8}{15}}$ C) $(13)^{\frac{1}{3}}$ D) $(13)^{\frac{-2}{15}}$

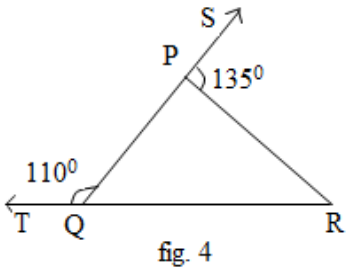

fig. 4

11. On which axes do the given points lie?
    (i) (0, 4) (ii) (–2, 0) (iii) (3, 0) (iv) (0, – 1)
12. Without actually calculating the cubes, find the value of $75^3 - 25^3 - 50^3$.
13. Express the number $0.\overline{53}$ in the form of $\frac{p}{q}$, where q ≠ 0.
14. Simplify:- ($\sqrt{3}$ + 2) ($\sqrt{3}$ – 2)
15. Simplify:- $(32)^{\frac{1}{5}} + (-7)^0 + (64)^{\frac{1}{2}}$
16. In ΔABC, if ∠A = 50^0 and ∠B = 60^0 determine the shortest and the longest side of the triangle.

17. In the fig.4, QP and RQ of ΔPQR are produced to points 'S' and 'T' respectively. If ∠SPR = 135^0 and ∠PQT = 110^0, find ∠PRQ.

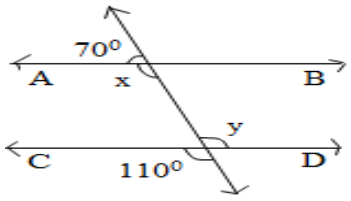

fig. 5

18. In fig.5, find 'x' and 'y' and then show that AB ∥ CD.

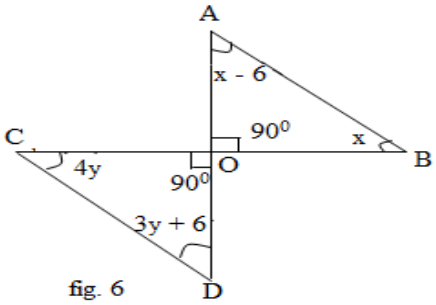

fig. 6

19. Find 'x' and 'y' in the fig.6.
20. Represent $\sqrt{5}$ on the number line.
21. Locate $\sqrt{4.5}$ on the number line.
22. Evaluate using suitable identity:- $(999)^3$.

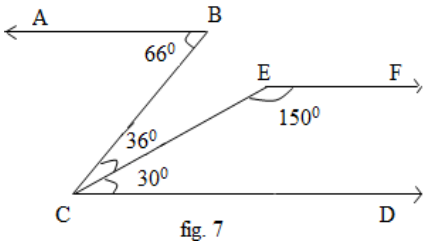

fig. 7

23. Factorize:- $27a^3 + 8b^3 + 54a^2b + 36ab^2$.
24. Expand the following:-
    (i) $\left(\frac{3}{2}x + 1\right)^3$ (ii) $(3a - 7b - c)^2$.
25. Express $5.3\overline{47}$ in the form of $\frac{p}{q}$ where p and q are integers and q ≠ 0.
26. AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that AD bisects BC.
27. In fig.7, show that AB ∥ EF. Where EF∥CD.
28. E and F are respectively the mid points of equal sides AB and AC of ΔABC. Show that BF = CE.

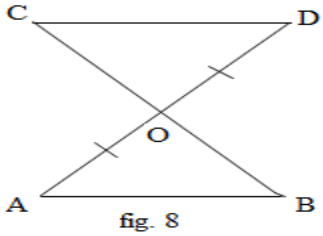

fig. 8

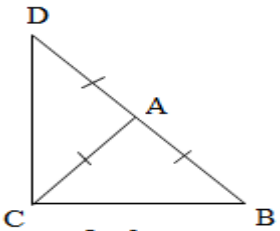

fig. 9

29. In fig.8, line segment AB ∥ CD and O is the mid-point of AD. Show that:-
    (i) ΔAOB ≅ ΔDOC. (ii) O is also the mid-point of BC.
30. In fig.9, ΔABC, is an isosceles triangle in which AB = AC, side BA is produced to D such that AD = AB. Show that ∠BCD is a right angle.
31. Find the area of a triangular park whose sides are of length:- 120m, 80m, and 50m.
32. In fig.10, triangle AOB with co-ordinates of A and O as (4,0) and (0,0). AB = 5. Find the co-ordinates of B.

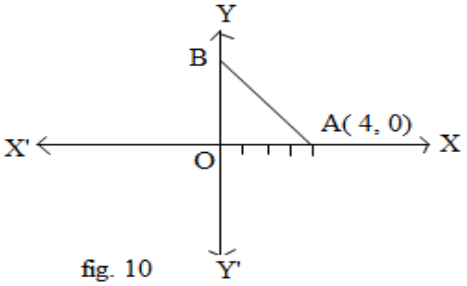

fig. 10

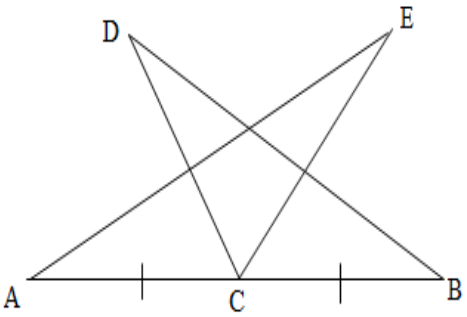

fig. 11

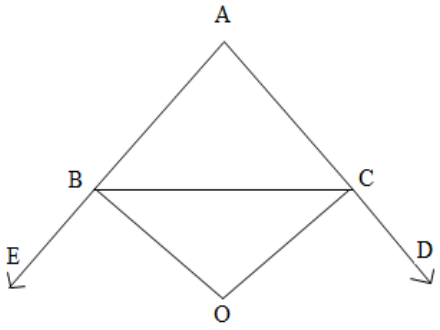

fig. 12

33. Factorize:- $x^3 - 3x^2 - 10x + 24$
34. Without actual division, prove that $(2x^4 - 6x^3 + 3x^2 + 3x - 2)$, is exactly divisible by $(x^2 - 3x + 2)$.
35. Factorize:- $x^8 - y^8$
36. Factorize:- $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$
37. Prove that the sum of the angles of a triangle is 180^0.
38. Prove that the angles opposite to the equal sides of a triangle are equal.
39. In fig.11, AC = BC, $\angle DCA = \angle ECB$ and $\angle DBC = \angle EAC$. Prove that :-
    $\Delta DBC \cong \Delta EAC$ (ii) DC = EC and BD = AE.
40. In fig.12, the sides AB and AC of ΔABC are produced to points E and D respectively. If bisectors BO and CO of $\angle CBE$ and $\angle BCD$ respectively meet at a point O, then prove that
    $\angle BOC = 90^0 - \frac{1}{2}\angle BAC$.

Solve the following questions.

Q1 A Maths books & 5 Note books together costs ₹ 420. Represent this statement as a linear eqn in 2-variables and give two solutions for it.

Q2 Check whether equations i) $\sqrt{x} + \frac{1}{\sqrt{x}} = 3$ ii) $\sqrt{2}x + \sqrt{3}y = 0$ are linear. Justify.

Q3 Find the value of 'k', if $(-2, 3)$ is a solution of $7x + 8y = 2k$ and hence find two more solutions

Q4 If the point $(-1, -5)$ lies on the graph of $3x = ay + 7$, then find the value of 'a'.

Q5 Draw the graph of linear eqn $x - 3y = -7$. From the graph, check whether $(-1, -2)$ is a sol. of this eqn.

Q6 Draw the graphs of $y = x$ and $y = -x$ on the same axes. Also, find the co-ordinates of the point where the two lines intersect.

Q7 The perimeter of a rectangle is 40 cm. Write an equation for this and draw its graph.

Q8 The taxi fares in a city are as follows. For the first Km, the fare is ₹ 12 & for the subsequent distance, it is ₹ 7/Km. Taking the distance covered as x kms & total fare as ₹ y, write a linear eqn and draw the graph.

Q9 Draw the graphs of the following eqns i) $3x + y = 6$ and $x - y = 2$. Shade the Δ formed with y-axis and find the area of the shaded portion.

Q10 The perimeter of a llgm is 36 cm. If the smaller side is 8 cm long, find the measure of the longer side.

Q11 Two opposite angles of a llgm are $(3x - 2)°$ and $(3 - 2x)°$. Find all the angles of the llgm.

Q12 If PQRS is a rhombus with $\angle PQR = 55°$, find $\angle PRS$.

Q13 ABCD is a llgm & AP and CQ are ⊥ from A and C on the diagonal BD.
Show that i) $\Delta APB \cong \Delta CQD$ ii) $AP = CQ$

Q14 Two ll lines l and m are intersected by a transversal 't'. Show that quadrilateral formed by bisectors of the interior angles is a rectangle.

Q15 If the diagonals of a llgm are equal, then show that it is a rectangle.

Q16 Show that the bisectors of angles of a llgm form a rectangle.

Q17 Prove that diagonals of a parallelogram divides it into two congruent Δs.

Q18 In ΔABC and ΔDEF, $AB = DE$ and $AB \parallel DE$, $BC = EF$ and $BC \parallel EF$. Vertices A, B and C are joined to D, E and F as shown in the figure. Show that:
i) ABED and BEFC are llgms ii) $CF = AD$ and $AD \parallel CF$. iii) ACFD is a llgm
iv) $AC = DF$ v) $\Delta ABC \cong \Delta DEF$.

Q19 ABCD is a quad. in which P, Q, R and S are the mid-points of sides AB, BC, CD & DA. Prove that PQRS is llgm.

Q20 In rt ΔABC, $\angle C = 90°$. A line through the mid-point M of AB and parallel to BC intersects AC at D. Show that: i) D is the mid-point of AC. ii) $MD \perp AC$ iii) $CM = MA = \frac{1}{2}AB$.

Q21 In a llgm PQRS, A and B are the mid-points of PQ and SR respectively. Show that the line segment AS and BQ trisects the diagonal PR.

Q22 Prove that in a Δ, the line segment joining the mid-points of any two sides is parallel to third side & half of it.

Q23 Using Q22 result, if P, Q, R are the mid-points of sides BC, AC and AB of ΔABC and if $PQ = 2.5$ cm $QR = 3$ cm, $RP = 3.5$ cm, find the length of AB, BC and CA.

Q24 Prove that the llgms on the same base & between the same parallels have the same area.

Q25 In the figure, PQRS and ABRS are llgm and X is any point on side BR. Show that:
i) $ar(PQRS) = ar(ABRS)$ ii) $ar(AXS) = \frac{1}{2} ar(PQRS)$

Q26 In ΔABC, P is the mid-point of median AD. Show that $ar(BPD) = \frac{1}{4} ar(ABC)$

Q27 In the given figure, O is the centre of the circle, $OM \perp BC$, $OL \perp AB$, $ON \perp AC$ and $OM = ON = OL$. Prove that ΔABC is equilateral Δ.

Q28 If two equal chords of a circle intersects within a circle, prove that the line joining the point of intersection to the centre makes equal angles with the chords.

Q29 PQRS is a cyclic quad. in which $\angle P = 2x°$, $\angle Q = y°$, $\angle R = 3x°$ and $\angle S = 2y°$. Find x and y.

Q30 Angle in a semi-circle is a right angle. Prove it.

Q31 If diagonals of a cyclic quad. are diameters of the circle and ⊥ to each other, prove that it is a square.

Q32 Prove that cyclic llgm is a rectangle.

Q33 Prove that angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

Q34 Construct a ΔABC in which $\angle B = 45°$, $\angle C = 60°$ and perimeter of $\Delta ABC = 12$ cm.

Q35 Construct a ΔABC in which $BC = 8$ cm, $\angle B = 45°$ and $AB - AC = 3.5$ cm.

Q36 Construct a ΔABC in which $BC = 4.5$ cm, $\angle C = 45°$ and $AB + AC = 8$ cm.

Q37 A river 3 m deep and 40 m wide is flowing @ 2 km/hr. How much water will fall into the sea in a minute?

Q38 The capacity of a closed cylindrical vessel of height 1 m is 15.4 l. How many square metres of metal sheet would be needed to make it?

Q39 The S.A of a sphere of radius 5 cm is five times the CSA of a cone of radius 4 cm. Find the height and volume of the cone.

Q40 A hollow cube of side 4 cm contains a solid sphere touching its sides. Find the volume of gaps between sphere and walls of cube.