Question

PRACTICE PAPER-1

MATHEMATICS
CLASS-IX

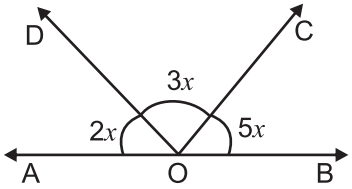
Time Allowed : 3 Hours **Maximum Marks : 80**

General Instructions :

1. All questions are compulsory.
2. The question paper consists of 30 questions divided into four section A, B, C, and D. Section-A comproses of 6 questions of 1 mark each; Section-B comprises of 6 questions of 2 marks each ; Section-C comprises of 10 questions of 3 marks each and section-D comprises of 8 questions of 4 marks each.
3. There is no overall choice in this question paper.
4. Use of calculator is not permitted.

Section-A

1. Find the value of $(64)^{1/2} \times (125)^{1/3}$.
2. If $p(x) = x^3-3x^2+2x$, then find the value of $p(1)$.
3. Points A (8, 4) & B (-2,4) lie on a line. AB is parallel to which axis.
4. If the graph of equation $2x + ky = 10k$, intersect x-axis at point (5,0). Find value of k.
5. Find the value of x from the adjacent figure.



6. Find the ratio of total surface area of a sphere and a solid hemisphere of same radius.

Section-B

7. Factorise : $8a^3 + \sqrt{27}\, b^3$
8. Find the coordinates of the point where the graph of the equation $5x + 2y = 10$ intersect both axes.
9. The sides of a triangle are 22cm, 20cm and 18 cm. Find its area.
10. The two consecutive class marks of a distribution are 52 & 57. Find the class limits.

11. A die is rolled 200 times & its outcomes are released as below:

Outcomes	1	2	3	4	5	6
Frequency	25	35	40	28	42	30

Find the probability of getting:

i) A multiple of 3.

ii) not a prime number.

12. Consider the following frequency distribution which gives the weights of 38 students of a class :

Weights (kg)	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	Total
No. of Std.	9	5	14	3	1	2	2	2	38

i) Find the probability that the weight of a student in the class lies between 36-45 kg.

ii) Give one event in this context having probability zero.

Section-C

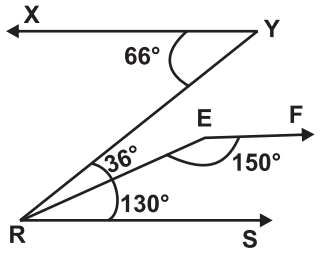
13. If $x=5-2\sqrt{6}$, find $x^2+\frac{1}{x^2}$

14. Simplify :

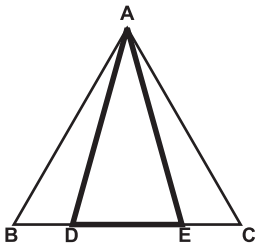
$$\left(\frac{x^a}{x^{-b}}\right)^{a-b}\left(\frac{x^b}{x^{-c}}\right)^{b-c}\left(\frac{x^c}{x^{-a}}\right)^{c-a}$$

15. Plot the points A (1,1), B (-1,5), C (7,9) and D (9,5). Name the type of figure ABCD. In which quadrant the point of intersection of diagonals lie?

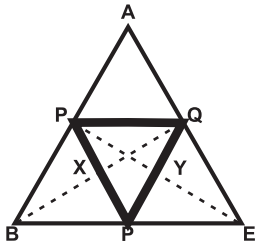
16. In the given figure, Show that XY||EF.



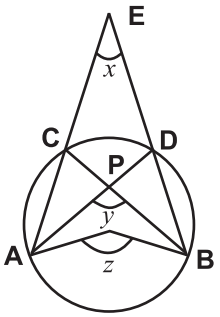
17. In the given figure, if AB=AC, $\angle BAD=\angle CAE$ then prove that ΔADE is an isosceles triangle.



18. P,Q & R are respectively, the mid points of sides BC, CA & AB of a triangle ABC. PR & BQ meet at X. CR & PQ meet at Y. Prove that XY= $\frac{1}{4}$BC.



19. In the given figure, O is the centre of a circle. Prove that $\angle x + \angle y = \angle z$.



20. Construct ΔABC such that BC= 8cm, $\angle$B=45°, AB-AC =3.5cm

21. If h, c and v respectively, are the height, the curved surface area and volume of a cone, prove that

$3\pi vh^3 - c^2h^2 + 9v^2 = 0$

22. The radius of a sphere is 10 cm. If the radius is increased by 1 cm. Then prove that volume of the sphere is increased by 33.1%.

Section-D

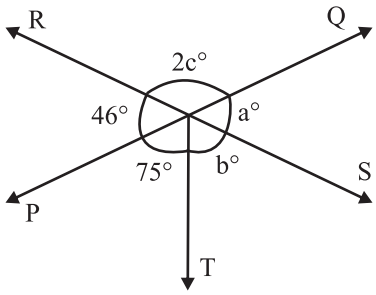
Express $0.6 + 0.4\overline{7} + 0.\overline{7}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

24. Verify :

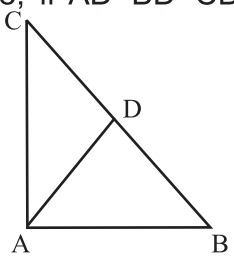
$$a^3 + b^3 + c^3 - 3abc = \frac{1}{2}(a+b+c)[(a-b)^2 + (b-c)^2 + (c-a)^2]$$

25. A pharmacist needs to strengthen a 15% alcohol solution to one of 32% alcohol. How much pure alcohol should be added to 800 ml of 15% solution?

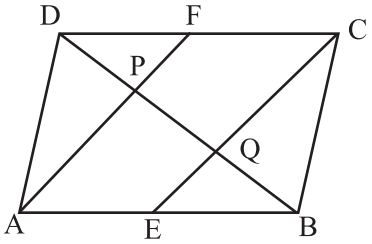
26. In the figure two straight lines PQ & RS intersect each other at O. If ∠POT=75°, find the values of a, b & c.



27. In the given figure, if AD=BD=CD. Prove that ∠BAC is right angle.



28. In a parallelogram ABCD, E&F are the mid Points sides AB & CD respectively. Show that the line segment AF & EC trisect the diagonal BD.



29. The residential colony has population of 5400 and 60 litres of water is required per person per day. For the effective utilization of rain water, a group of people decided for WATER HARVESTING. They constructed a water reservoir measuring 49m X27m x 25m to collect the rain water. If this water reservoirs is full of water then for how many days it will last for the colony

30. The Following table shows the life of LED bulbs.

Life Time (in hours)	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
No. of Bulbs	14	56	60	86	74	62	48

i) Represent the above information with the helper a histogram & frequency ploygon.

ii) How many bulbs have a life time of 700 hours & more?

PRACTICE PAPER-1

SOLUTIONS

1. 40 2. 0

3. x-axis 4. K=1

5. x=18 6. 4 :3

7. $8a^3+\sqrt{27}\,b^3 = (2a)^3+(\sqrt{3}b)^3$

$= (2a+\sqrt{3}b)((2a)^2-(2a)(\sqrt{3}\ b)+(\sqrt{3}\,b)^2)$

$[\because x^3+y^3=(x+y)(x^2-xy+y^2)$

$= (2a+\sqrt{3}b)(4a^2-2\sqrt{3}ab+3b^2)$

8. Let $5x+2y=10$ intersect x-axis and y-axis at points A $(x,0)$ and B (o,y) respectively.

$\therefore$ for point A $(x,0)$

$5x+2(0)=10 \quad x=2$

For point B $(0,y)$

$5(0)+2y=10 \quad y=5$

$\therefore$ A (2,0), B (0,5)

9. Let a=22 cm, b= 20cm, c=18cm

Semi perimeter (s) $= \frac{a+b+c}{2} = \frac{22+20+18}{2} = 30$ cm

By Heron's Formula

Area of triangle $= \sqrt{s(s-a)\,(s-b)\,(s-c)}$

$= \sqrt{30(30-22)\,(30-20)\,(30-18)}\ cm^2$

$= \sqrt{30 \times 8 \times 10 \times 12}\ cm^2$

$= 120\sqrt{2}\ cm^2$

10. Class size = 57-52=5

Class limits = $52-\frac{5}{2}, 52+\frac{5}{2}, 57-\frac{5}{2}, 57+\frac{5}{2}$

Class limits for class mark 52 = 49.5 – 54.5

Class limits for class mark 57= 54.5 – 59.5

11. i) P (multiple of 3) $= \frac{40+30}{200} = \frac{7}{20}$

ii) P (not a prime number) = $\frac{25+28+30}{200} = \frac{83}{200}$

12. i) Required probability $= \frac{5}{38}$

ii) eg. student selected at random have weight more than 70 kg. (other favourable outcomes are also possible.

13. $x = 5 - 2\sqrt{6}$

$$\frac{1}{x} = \frac{1}{5-2\sqrt{6}} \times \frac{5+2\sqrt{6}}{5+2\sqrt{6}} = 5 + 2\sqrt{6}$$

$$x + \frac{1}{x} = 10 \Rightarrow x^2 + \frac{1}{x^2} + 2 = 100 \quad [\because (a+b)^2 = a^2+2ab+b^2]$$

$$\boxed{x^2 + \frac{1}{x^2} = 98}$$

14. $\left(\frac{x^a}{x^{-b}}\right)^{a-b} \left(\frac{x^b}{x^{-c}}\right)^{b-c} \left(\frac{x^c}{x^{-a}}\right)^{c-a}$

$= (x^{a+b})^{a-b} (x^{b+c})^{b-c} (x^{c+a})^{c-a}$ $\left[\because \frac{a^m}{a^n} = a^{m-n}\right]$

$= x^{a^2-b^2} \cdot x^{b^2-c^2} \cdot x^{c^2-a^2}$ $\left[\because (a^m)^n = a^{mn}\right]$

$= x^{a^2-b^2+b^2-c^2+c^2-a^2}$ $\left[\because a^m \times a^n = a^{m+n}\right]$

$= x^\circ = 1$ $\left[\because a^\circ = 1\right]$

15. Plot the points on graph.

ABCD is a rectangle.

Intersecting point of diagonals is in I–quadrant

16. $\therefore \angle XYR = \angle YRS = 66^\circ \Rightarrow XY \parallel RS$ _____ I

$\angle FER + \angle SRE = 180^\circ \Rightarrow EF \parallel RS$ _____ II

From I and II

$XY \parallel EF$

17. In ΔABC

$AB = AC$

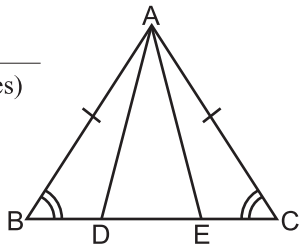
$\therefore \angle B = \angle C$ ..... (1) (Given) / (Angles opposite to equal sides)

In ΔBAD and ΔCAE

$\angle BAD = \angle CAE$ (given)

$AB = AC$ (given)

$\angle B = \angle C$ (from (1))



$\therefore \Delta BAD \cong \Delta CAE$ (ASA congruency)

$\therefore AD = AE$ (CPCT)

$\therefore$ ADE is an Isosceles Triangle.

18. Given : A Δ ABC with P, Q, R, as the mid-points of BC, CA and AB respectively. PR and BQ meet at X and CR and PQ meet at Y.

Construction :- The Join X & Y

Proof : Since the line Segment joining the mid-point of two sides of a triangle is parallel to the third side and half of it. Therefore Q & R are mid-points of AC and AB respectively.

By Mid Point theorem

$\Rightarrow RQ \parallel BC$ and $RQ = \frac{1}{2} BC$

$\Rightarrow RQ \parallel BP$ and $RQ = BP$ [$\therefore$P is the mid point of BC, $\frac{1}{2} BC = BP$]

BPQR is a parallelogram

$\therefore$ the diagram of a parallelogram bisect each other.

$\therefore$ X is the mid point of PR

Similarly , Y is the midpoint of PQ.

Consider, ΔPQR, XY is the line segment joining the mid points of sides PR and PQ.

$XY = \frac{1}{2} RQ$

$RQ = \frac{1}{2} BC$

$\boxed{XY = \frac{1}{4} BC}$

19. $\angle CPD = \angle Y$ (V.O.A.)

$\angle ACB = \angle ACP = \frac{\angle z}{2}$, $\angle ADB = \angle BDP = \frac{\angle z}{2}$ (Angle at centre if a circle is double the angle on remaining part of the circle)

$\angle BCE = \angle PCE = 180^{\circ} - \frac{\angle z}{2}$ (By Linear Pair)

$\angle ADE = \angle PDE = 180^{\circ} - \frac{\angle z}{2}$

In quadrilateral ACPD

$\angle DEC + \angle PCE + \angle CPD + \angle PDE = 360^{\circ}$ (By Angle sum property of quadrilateral)

$\angle x + 180 - \frac{\angle z}{2} + \angle y + 180 - \frac{\angle z}{2} = 360^{\circ}$

$\angle x + \angle y = \frac{\angle z}{2} + \frac{\angle z}{2} + \cancel{360^{\circ}} - \cancel{360^{\circ}}$

$\boxed{\angle x + \angle y = \angle z}$

21. Height of cone = h

slant height of cone = $l = \sqrt{h^2 + r^2}$

curved surface area of cone

$C = \pi rl = \pi r \sqrt{h^2 + r^2}$

$C^2 = \pi^2 r^2 (h^2+r^2) = \pi^2 r^2 h^2 + \pi^2 r^2$

Volume of cone = $V = \frac{1}{3}\pi r^2 h$

$3\pi V h^3 - C^2 h^2 + 9V^2$

$= 3\pi (\frac{1}{3}\pi r^2 h) \times h^3 - (\pi^3 r^2 h^2 + \pi^2 r^4) h^2 + 9 (\frac{1}{3}\pi r^2 h)^2$

$= \frac{3\pi^2 r^2 h^4}{3} - \pi r^2 h^4 - \pi^2 r^4 h^2 + \frac{9 \times \pi^2 r^4 h^2}{9}$

$= \pi^2 r^2 h^4 - \pi^2 r^2 h^4 - \pi^2 r^4 h^2 + \pi^2 r^4 h^2 = 0$

$\therefore = 3\pi v h^3 - c^2 h^2 + 9v^2 = 0$

22. r_1 = radius of sphere = 10 cm.

Volume of sphere = $v_1 = \frac{4}{3}\pi r_1^3 = \frac{4}{3}\pi \times (10)^3 = \frac{4}{3}\pi \times 1000$

$V_1 = \frac{4000}{3}\pi cm^3$ _____(1)

If the radius of sphere increases by 1cm

$r_2 = 10$ cm + 1 cm = 11cm

New Volume of sphere

$V_2 = \frac{4}{3}\pi r_2^3 = \frac{4}{3}\pi \times (11)^3$

$V_2 = \frac{4}{3}\pi \times 1331 = \frac{5324}{3}\pi cm^3$

$V_2 = \frac{5324}{3}\pi cm^3$ _____(2)

Increased in volume of sphere

$V = V_2 - V_1 = \frac{5324\pi}{3} - \frac{4000\pi}{3}$

$V = \frac{1324\pi}{3} cm^3$ _____(3)

% increase in the volume of sphere

$= \frac{V}{V1} \times 100\%$

$$= \frac{\frac{1324\pi}{3}}{\frac{4000\pi}{3}} \times 100\%$$

$$= \frac{1324\pi}{4000} \times 100\%$$

$$= \frac{331}{10} = 33.1\%$$

% Increase in the volume of sphere

= 33.1%

23. $0.6 = \frac{6}{10}$

Let $x = 0.4\overline{7} = 0.4777.....$

$10x = 4.77$ _____I

$100x = 47.77$_____II

II-I $\Rightarrow 100x - 10x = (47.7...) - (4.77....)$

$\Rightarrow 90x = 43$

$\Rightarrow x = \frac{43}{90}$

Let $y = 0.\overline{7} = 0.77....$ _____III

10y= 7.77 .... _____IV

IV-III $\Rightarrow$

$ay = 7 \Rightarrow y =$

$\therefore 0.6 + 0.4\overline{7} + 0.\overline{7} = \frac{6}{10} + \frac{43}{90} + \frac{7}{9}$

$= \frac{167}{90}$

24. $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

$= \frac{1}{2}(a+b+c)(2a^2+2b^2+2c^2-2ab-2bc-2ca)$

$= \frac{1}{2}(a+b+c)(a^2+b^2-2ab+b^2+c^2-2bc+c^2+a^2-2ca$

$= \frac{1}{2}(a+b+c)[(a-b)^2+(b-c)^2+(c-a)^2]$

25. Let *x ml* of pure alcohol be added

Quantity of pure alcohol in (800+x) ml of 32% solution

= Quantity of pure alcohol in 800 ml of 15%

Solution x ml of pure alcohol

32% of (800+x) = 15% of 800 + x

$\Rightarrow \frac{32}{100} \times (800+x) = 15 \times \frac{1}{100} \times 800 + x$

$\Rightarrow 25600 + 32x = 12000 + 100x$

$\Rightarrow 100x - 32x = 25600 - 12000$

$\Rightarrow$ x = 200ml

$\therefore$ 200ml of pure alcohol should be added

26. 4b+ 75 + b = 180

5b = 105

$\Rightarrow$ b = 21

4b = a (V.O.A)

$\Rightarrow a = 84$

$\therefore$ 2c = 180 - a = 96

$\Rightarrow$ c= 48

27. In ΔABD

AD=BD (given)

$\therefore \angle BAD = \angle ABD$ (Equal $\angle$s opp to equal sides)

Let $\angle BAD = \angle ABD$ = x

In Δ ACD

AD=CD (given)

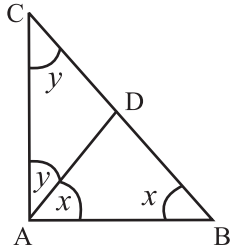
$\therefore \angle CAD = \angle ACD = y$

In Δ ABC $\angle A + \angle B + \angle C = 180°$

$\Rightarrow (x + y) + x + y = 180°$

$\Rightarrow x + y = 90°$

$\therefore \angle BAC = 90 \Rightarrow \angle BAC$ is right angle.



28. Since E & F are mid points of AB & CD

$\therefore$ AE = $\frac{1}{2}$ AB & CF $\frac{1}{2}$ CD .....(1)

But ABCD is a parallelogram

$\Rightarrow$ AB = CD & AB || DC

$\Rightarrow \frac{1}{2}AB = \frac{1}{2}CD$ & AB $\parallel$ DC

$\Rightarrow$ AE= FC & AE $\parallel$ DL

$\Rightarrow$ AECF is a parallelogram

$\Rightarrow$ FA$\parallel$CF FP$\parallel$CQ.....(2)

In ΔPCD F is the mid point of CD & FP $\parallel$ CQ

$\therefore$ P is the mid point of DQ

$\Rightarrow$ PQ = DP .....(3)

Similarly in ΔABP, E is the mid point of AB & AP$\parallel$EQ

$\Rightarrow$ Q is the mid point of BP

$\Rightarrow$ BQ= PQ.....(4)

From (3) & (4) DP = PQ = QB

$\Rightarrow$ BD Trisects AP & CE

29. Vol. of tank $= 48m \times 27m \times 5m$

$= 6480\ m^3$

$= 6480 \times 1000l$

$= 6480000l$

Vol. of water required in 1 day $= 60 \times 5400l$

$= 324000l$

No. of Days $= \frac{\text{Vol. of water in tank}}{\text{Vol. of water required in 1 day}}$

$= \frac{6480000}{324000} = 20$ days

(ii) values (i) Environmental Values

(ii) Cooperation

30 (b) No. of LED Bulbs working for

700 hours of more $= 74 + 62 + 48$

$= 184$

$= 184$ Bulbs