

Q1) Solve the equation $3(x+2) = 2(2x-1)$ and represent the solution on:

- i. the Number Line.
- ii. the Cartesian Plane

Ans 1. $3(x+2) = 2(2x-1)$
 or, $3x+6 = 4x-2$
 $\Rightarrow x=8$

Q2) ABCD is a parallelogram. The bisector of angle A also bisects BC at X. Prove that: $AD = 2AB$.

Ans 2. Let ABCD be a $\parallel gm$ in which bisector of $\angle A$ meets BC at X such that $BX = CX$.

Draw $XY \parallel BA$, meeting AD at Y.

Since X is mid-point of BC and $XY \parallel BA \parallel CD$

Y is also mid-point of AD, i.e. $AY = YD$ 1

Let $\angle XAB = x^\circ = \angle XAY$ (i)

$\Rightarrow \angle AXY = x^\circ$ alt angle(ii)

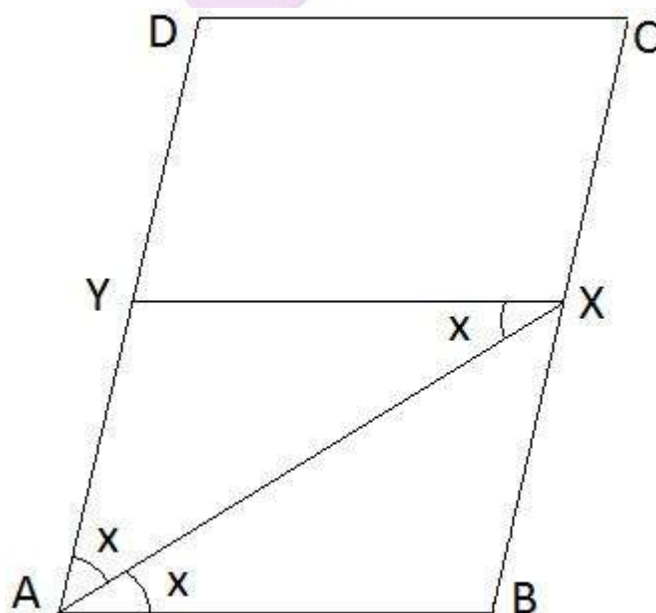
From (i) & (ii)

$\angle YAX = \angle YXA = x^\circ \Rightarrow AY = XY$ 1

or, $AY = AB$ ($XY = AB$, $ABXY$ is $\parallel gm$)

or, $2AY = 2AB$

or, $AD = 2AB$



Q3) Angles of a quadrilateral are in ratio 2:4:5:7. Find all the angles.

Ans 3. Let the angles of the quadrilateral be $2x^\circ, 4x^\circ, 5x^\circ$ and $7x^\circ$

$$\Rightarrow 2x^\circ + 4x^\circ + 5x^\circ + 7x^\circ = 360^\circ$$

$$\Rightarrow x = 20^\circ$$

\therefore Angles are $40^\circ, 80^\circ, 100^\circ$ and 140°

Q4) Prove that the median of a triangle divides it into two triangles of equal area.

Ans 4. In $\triangle ABC$, AD is median, $\therefore BD = DC$

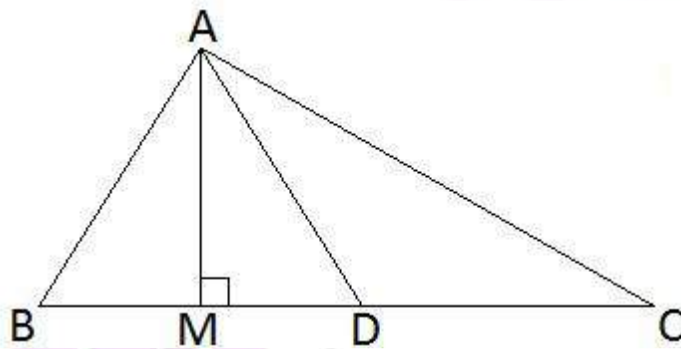
Draw, $AM \perp BC$, 1

$$\text{ar } \triangle ABD = \frac{1}{2} \times BD \times AM \dots\dots\dots(i)$$

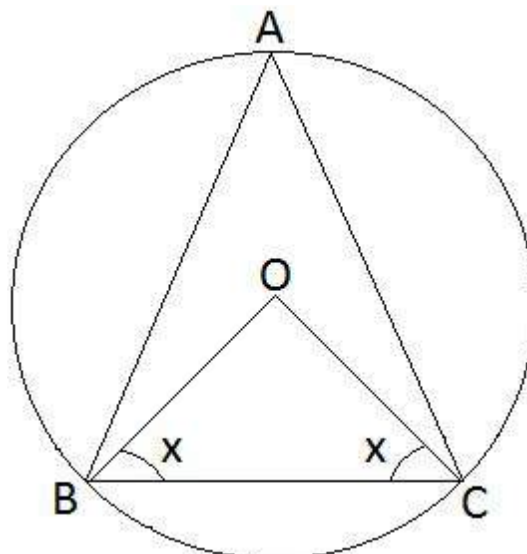
$$\text{ar } \triangle ADC = \frac{1}{2} \times DC \times AM = \frac{1}{2} \times BD \times AM \dots\dots\dots(ii)$$

From (i) & (ii),

$$\text{ar } \triangle ABD = \text{ar } \triangle ADC$$



Q5) In the given figure, O is the centre of the circle. Prove that $\angle OBC + \angle BAC = 90^\circ$



Ans 5. $\angle BOC = 2\angle BAC$

$$\begin{aligned} \text{or, } 180^\circ - 2x &= 2\angle BAC \text{ 1 or, } 90^\circ - x = \angle BAC \\ \text{or, } 90^\circ &= x + \angle BAC \text{ 1} \\ \text{or, } 90^\circ &= \angle OBC + \angle BAC \end{aligned}$$

Q6) Construct an angle of $22\frac{1}{2}^\circ$ using scale and compass only.

Ans 6. Make a neat and correct construction of given measure.

Q7) A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube?

Ans 7.

$$\begin{aligned} \text{Volume of the solid cube} &= 12 \times 12 \times 12 = 1728 \text{ cm}^3 \\ \text{Let the side of the new cube} &= x \text{ cm} \\ \text{Volume of 8 such cubes} &= 8x^3 \text{ cm}^3 \\ \text{A/q, } 8x^3 &= 1728 \\ \Rightarrow x &= 6 \text{ cm} \end{aligned}$$

Q8) Eleven bags of wheat flour, each marked 5 kg, actually contained the following weights of flour (in kg).

4.97, 5.05, 5.08, 5.03, 5.00, 5.06, 5.08, 4.98, 5.04, 5.07, 5.00.

Find the probability that any of these bags chosen at random contains more than 5 kg of flour.

Ans 8.

$$\begin{aligned} n(s) &= 11 \\ n(e) &= 7 \\ P(\text{bags containing more than 5 kg of flour}) &= \frac{7}{11} \end{aligned}$$

The Questions number from 9 to 18 below carries 4 marks each:

Q9) Let the cost of a pen and a pencil be 'x' and 'y' respectively. A girl pays Rs 16 for 2 Pens and 3 Pencils. Write the given data in the form of a linear equation in two variables. Also, represent it graphically.

Ans 9.

$$2x + 3y = 16$$

Make a correct table and graph.

Q10) Prove that the quadrilateral formed (if possible) by the internal angle bisectors of any quadrilateral is cyclic.

Ans 10. Let ABCD be a quadrilateral. Internal bisectors of $\angle A$, $\angle B$, $\angle C$ and $\angle D$ form

Quadrilateral EGFH.

$$\text{In } \triangle ADG, \angle AGD = 180^\circ - \left(\frac{1}{2}\angle A + \frac{1}{2}\angle D\right) \dots\dots\dots(i)$$

But, $\angle AGD = \angle EGF$ (VOA)

$$\therefore \angle EGF = 180^\circ - \left(\frac{1}{2}\angle A + \frac{1}{2}\angle D\right) \dots\dots\dots(ii)$$

$$\text{Similarly, } \angle EHF = 180^\circ - \left(\frac{1}{2}\angle B + \frac{1}{2}\angle C\right) \dots\dots\dots(iii)$$

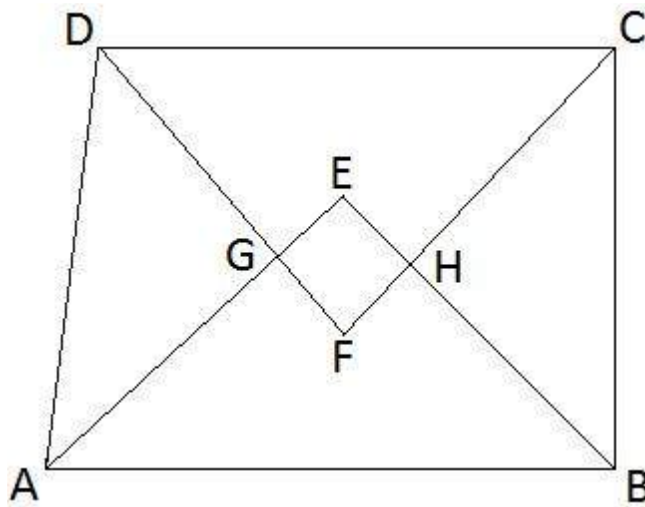
Adding (ii) and (iii),

$$\angle EGF + \angle EHF = 360^\circ - \frac{1}{2}(\angle A + \angle B + \angle C + \angle D)$$

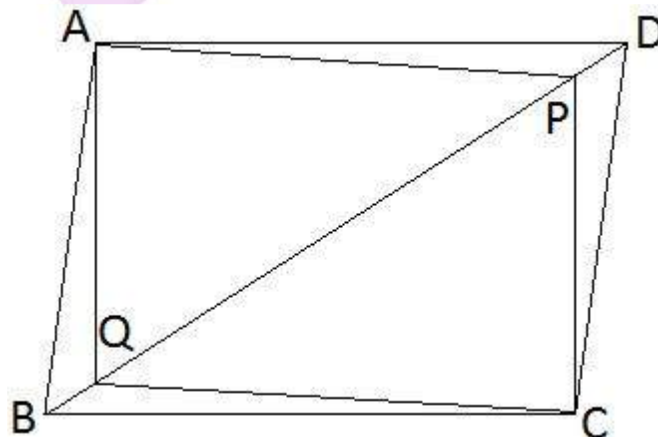
$$= 360^\circ - \frac{1}{2} \times 360^\circ$$

$$= 180^\circ$$

\therefore Quadrilateral EGFH is cyclic.



Q11) In the figure, ABCD is a parallelogram and P, Q are the points on the diagonal BD such that BQ = DP. Show that APCQ is a parallelogram.



Ans 11.

Construction: Join diagonal AC

Let AC and BD intersect each other at O.

Since diagonals of a *||gm* bisect each other.

$$\Rightarrow OA = OC \text{ and } OB = OD$$

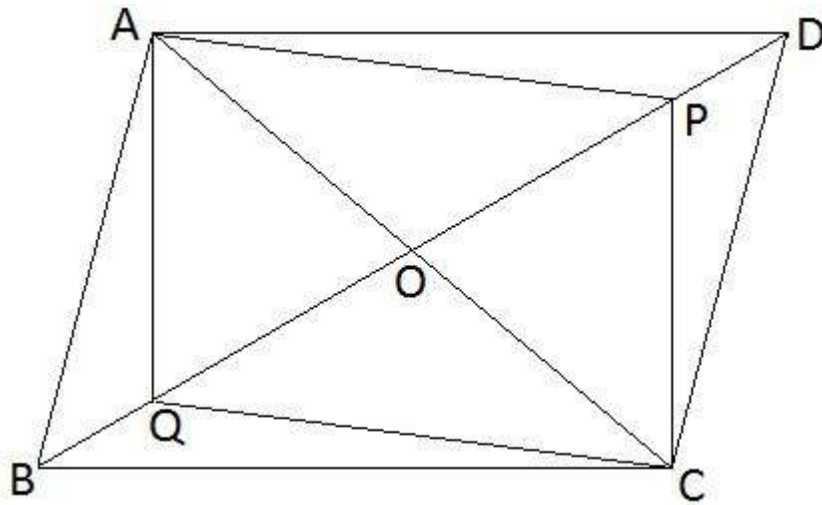
It is given that $BQ=DP$

or, $OB-BQ=OD-DP$

$\Rightarrow OQ=OP$

In quadrilateral $APCQ$, diagonals AC & PQ bisect each other.

$\therefore APCQ$ is a $\parallel gm$



Q12) Draw the graph of linear equation $x = 4$ and $y = 5$. Find the area formed by the two graphs and the axes.

Ans 12. For correct table and graph of equation $x = 4$ ^{1/2}
 For correct table and graph of equation $y = 5$ ^{1/2}
 For correct area.

Q13) A metal pipe is 77 cm long. The inner diameter of a cross-section is 4 cm, the outer diameter being 4.4 cm. Find its total surface area.

Ans 13. Inner radius (r) = 2 cm

Outer radius (R) = 2.2 cm

Height (h) = 77 cm

$\therefore R+r = 4.2, R-r = 0.2$

Total SA = Inner CSA + Outer CSA + Area of Circular rings on both ends.

$$= 2\pi rh + 2\pi Rh + 2(\pi R^2 + \pi r^2)$$

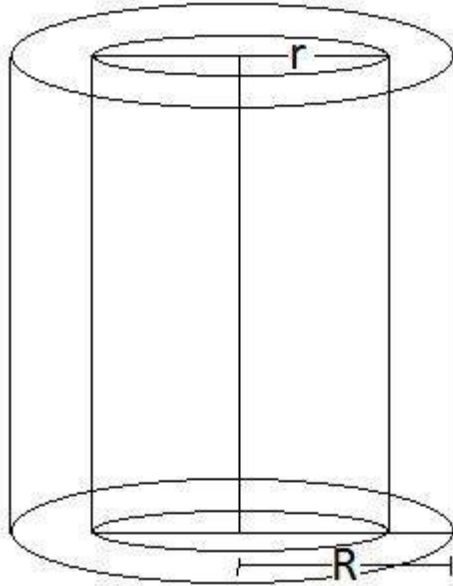
$$= 2\pi \{rh + Rh + (R^2 - r^2)\}$$

$$= 2 \times \frac{22}{7} (2 \times 77 + 2.2 \times 77 + 4.2 \times 0.2)$$

$$= 2 \times \frac{22}{7} (154 + 169.4 + 0.84)$$

$$= \frac{44}{7} \times 324.24$$

$$= 2038.08 \text{ cm}^2$$



Q14) Construct a ΔXYZ in which $\angle Y=60^\circ, \angle Z=45^\circ$ and $XY+YZ+ZX=11$ cm. Also, write the steps of construction.

Ans 14. Do the correct construction as per given scale. Follow the steps for construction.

Q15) In a society, 6 children out of 28 did not participate in the campaign 'Save Energy'. Find the probability that a child selected at random.

- i. participated in the Campaign.
- ii. did not participate in the Campaign.

Which values of children are depicted here?

Ans 15. i) No. of children participated in campaign $=28-6=22$

$$P(E) = \frac{22}{28} = \frac{11}{14}$$

$$(ii) P(E) = \frac{6}{28} = \frac{3}{14}$$

Value: The children are socially active, futuristic and disciplined.

Q16) A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of Rs 12.50 per meter square.

Ans 16. CSA of Pillar $= 2 \times \frac{22}{7} \times \frac{25}{100} \times 3.5 = 5.5 \text{ m}^2$

Cost of painting $= \text{Rs } 5.50 \times 12.50 = \text{Rs } 68.75$

Q17) How many litres of milk can a hemispherical bowl of diameter 10.5 cm hold?

Ans 17. Volume of bowl = $\frac{2}{3}\pi (5.25)^3 \text{ cm}^3$
= 303.1875 cm^3
= 0.3031875 litre .

Q18) Which social networking site is more beneficial in learning mathematics and how?

Ans 18. Name the social networking site. Also include its benefits.

Q19) In a parallelogram ABCD, if $\angle A = 2x + 25^\circ$ and $\angle B = 3x - 5^\circ$, find the value of x.

Ans 19. In $\parallel gm ABCD$, $\angle A + \angle B = 180^\circ$
or, $2x + 25 + 3x - 5 = 180^\circ$
 $\Rightarrow x = 32^\circ$

Q20) Find the points on the graph of the linear equation $3x + 5y = 15$, where it cuts the x-axis and y-axis.

Ans 20. Putting $y = 0$ in the equation, we have $x = 5$
i.e. the graph cuts X-axis at $(5, 0)$
Putting $x = 0$, we get $y = 3$
i.e. graph cuts Y-axis at $(0, 3)$