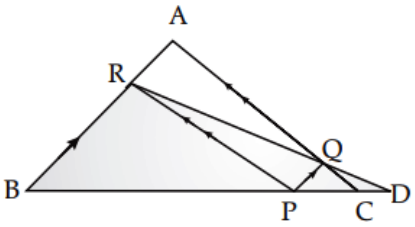
Class 10 Mathematics

Source: CBSE Previous Year Questions (PYQs) | Total Questions: 31
Chapter: Triangles and Surface Areas and Volumes

Part A: Triangles (Ch 6)

3-Mark Questions

1. State and prove the Basic Proportionality Theorem. (2020,2023)
2. In $\triangle ABC, DE \| BC$. If $AD = x, DB = x - 2, AE = x + 2$ and $EC = x - 1$, find the value of x. (2016,2019)
3. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD \cdot$ (2015,2023)
4. A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower. (2014,2020)
5. If a line intersects sides AB and AC of a $\triangle ABC$ at D and E respectively and is parallel to BC, prove that $\frac{AD}{AB} = \frac{AE}{AC}$. (2018)
6. $ABCD$ is a trapezium in which $AB \| DC$ and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO} \cdot$ (2012,2021)
7. In the given figure, $PQ \| BA$ and $PR \| CA$. If $PD \perp BC$, prove that $PD^2 = BD$. CD. (2023)



8. E is a point on the side AD produced of a parallelogram $ABCD$ and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$. (2016,2022)
9. Through the mid-point M of the side CD of a parallelogram $ABCD$, the line BM is drawn intersecting AC in L and AD produced in E. Prove that $EL = 2BL$. (2013)

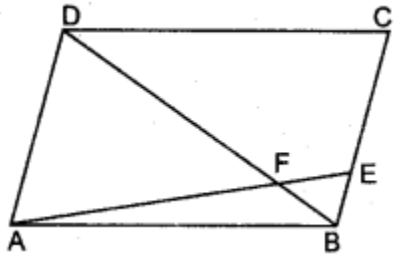
5-Mark Questions

10. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Using this, find x if $DE \| BC$ in $\triangle ABC$ with $AD = x, DB = x - 3, AE = x + 3, EC = x - 2$. (2024)
11. In $\triangle ABC, AD$ and PM are medians of $\triangle ABC$ and $\triangle PQR$ respectively where $\triangle ABC \sim \triangle PQR$. Prove that $\frac{AB}{FQ} = \frac{AD}{PM} \cdot$ (2017,2023)

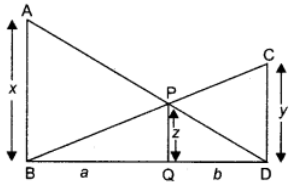
12. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$. (2020, 2024)

13. Prove that if in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio and hence the two triangles are similar. (2019)

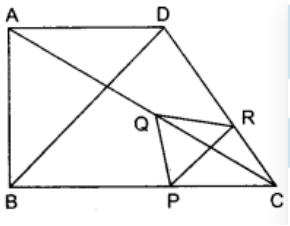
14. In the figure, $ABCD$ is a parallelogram and E divides BC in the ratio 1: 3. DB and AE intersect at F. Show that $DF = 4FB$ and $AF = 4FE$



15. In figure, $AB \| PQ \| CD, AB = x$ units, $CD = y$ units and $PQ = z$ units, prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$



16. In figure, two triangles ABC and DBC lie on the same side of base BC. P is a point on BC such that $PQ \| BA$ and $PR \| BD$. Prove that $QR \| AD$.



Part B: Surface Areas and Volumes (Ch 12)

3-Mark Questions

17. A solid is in the form of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of π. (2021)

18. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litres per second. How much time will it take to empty half the tank, if it is $3m$ in diameter? (2014,2019)

19. A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 22 m by 14 m . Find the height of the platform. (2015,2022)

20. Two cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid. (2013,2023)
21. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm . Find the height of the cylinder. (2017,2020)
22. A cone of height 24 cm and radius of base 6 cm is made up of modeling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere. (2018)
23. A heap of rice is in the form of a cone of diameter 9 m and height 3.5 m . Find its volume. How much canvas cloth is required to just cover the heap? (2020,2024)
24. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm , find the total surface area of the article. (2019,2023)
25. A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment. (2016)
26. 500 persons are taking a dip into a rectangular tank which is 80 m long and 50 m broad. What is the rise of water level in the tank, if the average displacement of water by a person is 0.04 m^3 ? (2015)

5-Mark Questions

27. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m , find the area of the canvas used. Also, find the cost of the canvas at the rate of ₹500/m^2. (2020,2023)
28. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm . Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (2012,2018)
29. A gulab jamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in **45** gulab jamuns, each shaped like a cylinder with two hemispherical ends with length 5 cm and diameter 2.8 cm . (2020,2024)
30. A solid metallic sphere of radius 28 cm is melted and recast into small cones of radius 4.2 cm and height 2.8 cm . Find the number of cones. (2016,2022)
31. Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed? (2019,2023)

Answer Key

Q. No	Answer	Q. No	Answer
2	$x = 4$	22	6 cm
4	42 m	23	Vol: 74.25m^3, Area: 80.61m^2

17	πcm^3	25	1.125 m
18	16.5 mins	26	0.5 cm
19	**2. 5 m**	27	Area: $44m^2$, Cost: ₹22,000
20	160 cm^2	28	Toy: 25.12 cm^3, Diff: 25.12 cm^3
21	2.74 cm	29	338 cm^3 (approx)
30	6400 cones	31	56.25 hectares ($562500m^2$)