10 TH MATHS GEOMETRY & GRAPH

COMPLETE QUESTION BANK EM 2024-2025

SIMILAR TRIANGLE

I. SCALE FACTOR < 1 MODEL SUM (IN SIDE TRIANGLE)

1. Construct a triangle similar to a given triangle **PQR** with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle **PQR** (**Scale Factor** $\frac{3}{5} < 1$).
2. Construct a triangle similar to a given triangle **PQR** with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle **PQR** (**Scale Factor** $\frac{2}{3} < 1$).
3. Construct a triangle similar to a given triangle **LMN** with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle **LMN** (**Scale Factor** $\frac{4}{5} < 1$).

II. SCALE FACTOR > 1 MODEL SUM (OUT SIDE TRIANGLE)

1. Construct a triangle similar to a given triangle **PQR** with its sides equal to $\frac{7}{4}$ of the corresponding sides of the triangle **PQR** (**Scale Factor** $\frac{7}{4} > 1$).
2. Construct a triangle similar to a given triangle **ABC** with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle **ABC** (**Scale Factor** $\frac{6}{5} > 1$).
3. Construct a triangle similar to a given triangle **PQR** with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle **PQR** (**Scale Factor** $\frac{7}{3} > 1$).

SINGLE TANGENT & ALTERNATE SEGMENT & TWO TANGENT

III. SINGLE OR ONE TANGENT (RADIUS IS GIVEN)

1. Draw a circle of **radius 3 cm**. Take a point P on this circle and draw **a tangent at P**.
2. Draw a tangent at any point R on the circle of **radius 3.4 cm** and centre at **P**?.

IV. ALTERNATE SEGMENT OR CHORD TANGENT THEOREM USING (RADIUS IS GIVEN)

1. Draw a circle of **radius 4 cm**. At a point L on it draw a **tangent** to the circle using the **alternate segment**.
2. Draw a circle of **radius 4.5 cm**. Take a point on the circle. Draw the tangent at that point using the **Alternate Segment Theorem.**

V. TWO TANGENT (DIAMETER OR RADIUS IS GIVEN) MOST IMPORTANT

1. Draw a circle of **diameter 6 cm** from a point P, which is **8 cm** away from its centre. Draw the **two tangents PA** and **PB** to the circle and measure their lengths.
2. Draw the **two tangents** from a point which is **10 cm** away from the centre of a circle of **radius 5 cm**. Also, measure the lengths of the tangents.
3. Take a point which is **11 cm** away from the centre of a circle of **radius 4 cm** and draw the **two tangents** to the circle from that point.
4. Draw the **two tangents** from a point which is **5 cm** away from the centre of a circle of **diameter 6 cm**. Also , measure the **lengths of the tangents**.

5. Draw **a tangent** to the circle from the point P having **radius 3.6 cm.** and centre O point P is at a **distance 7.2 cm** from the centre.

CONSTRUCTION OF A TRIANGLE

VI. INCIRCLE TRIANGLE OR MEDIAN SUM (MEDIAN IS GIVEN)

1. Construct a ΔPQR in which $PQ = 8$ **cm**, $\angle R = 60^\circ$ and the **Median RG** from R to **PQ is 5.8 cm**. Find the length of the **altitude from R to PQ**.
2. Construct a ΔPQR in which base $PQ = 4.5$ **cm**, $\angle R = 35^\circ$ and the **Median RG** from R to **PQ is 6 cm**.
3. Construct a ΔPQR in which $QR = 5$ **cm**, $\angle P = 40^\circ$ and the **Median PG** from P to **QR is 4.4 cm**. Find the length of the Altitude from P to QR.

VII. INCIRCLE TRIANGLE OR ALTITUDE SUM (ALTITUDE IS GIVEN)

1. Construct a ΔPQR in which such that $QR = 5$ **cm**, $\angle P = 30^\circ$ and the **Altitude** from P to **QR is of length 4.2 cm**.
2. Construct a ΔPQR in which such that $QR = 6.5$ **cm**, $\angle P = 60^\circ$ and the **Altitude** from P to **QR is of length 4.5 cm**
3. Construct a ΔPQR in which such that $QR = 5.5$ **cm**, $\angle P = 25^\circ$ and the **Altitude** from P to **QR is of length 4 cm**.

VIII. INCIRCLE TRIANGLE OR BISECTOR SUM (BISECTOR IS GIVEN)

1. Draw a triangle ΔABC of base $BC = 8$ **cm**, $\angle A = 60^\circ$ and the **Bisector** of $\angle A$ meets BC at D such that **BD = 6 cm.**
2. Draw a triangle ΔABC of base $BC = 5.6$ **cm**, $\angle A = 40^\circ$ and the **Bisector** of $\angle A$ meets BC at D such that **BD = 4 cm.**
3. Draw a triangle ΔPQR such that $PQ = 6.8$ **cm**, **vertical angle** is 50° and the **Bisector** of vertical angle meets the base at D where **PD = 5.8 cm.**

GRAPH OF VARIATION

I. DIRECT VARIATION MODEL SUM (GRAPH STRAIGHT LINE)

1. **Varshika drew 6** circles with different sizes. Draw a graph for the relationship between the **diameter and circumference** (approximately related) of each circle as shown in the table and use it to find the circumference of a circle when its **diameter is 6 cm.**

Diameter (x) cm	**1**	**2**	**3**	**4**	**5**
Circumference (y) cm	**3.1**	**6.2**	**9.3**	**12.4**	**15.5**

2. A bus is travelling at a uniform speed of **50 km / hr**. Draw the **distance time graph** and hence find
   (i) The **constant of variation**.
   (ii) How far will it travel in **90 minutes or 1 ½ hrs?.**
   (iii)The time required to cover a distance of **300 km** from the graph.

3. A garment shop announces a flat **50 % discount** on every purchase of items for their customers. Draw the graph for the relation between the **Marked Price and the Discount**. Hence find

(i) The marked price when a customer gets a **discount of ₹ 3250 (from graph).**

(ii) The discount when the **marked price is ₹ 2500.**

4. Graph the following **linear function** $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also find

(i) y when $x = 9$ and (ii) x when $y = 7.5$.

5. A two wheeler parking zone near bus stand charges as below.

Time x (in hours)	4	8	12	24
Amount y (in ₹)	60	120	180	360

Check if the amount charged are in direct variation or in inverse variation to the parking time. Graph the data. Also

(i) Find the amount to be paid when parking **time is 6 hrs**.

(ii) Find the parking duration when the amount **paid is ₹ 150**.

II. INVERSE OR INDIRECT VARIATION MODEL SUM (GRAPH CURVE LINE)

1. A Company initially started with **40 workers** to complete the work by **150 days**. Later it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

(i) Graph the above data and identify the **type of variation**.

(ii) From the graph, find the number of days required to complete the work if the company decides to opt for **120 workers?.**

(iii) If the work has to be completed by **200 days**, how many workers are required?.

2. **Nishanth** is the winner in a Marathon race **12 km distance**. He ran at the uniform speed of **12 km / hr** and reached the destination in **1 hour**. He was followed by Aradhana, Jeyanth, Sathya and Swetha with their respective speed of **6 km / hr, 4 km / hr, 3 km / hr and 2 km / hr**. And, they covered the distance in **2 hrs, 3 hrs, 4 hrs and 6 hours** respectively.

Draw the Speed- time graph and use it to find time taken to Kaushik with his speed **2.4 km / hr**.

3. Draw the graph of $xy = 24, x, y > 0$. Using the graph find,

(i) y when $x = 3$ and (ii) x when $y = 6$.

4. The following table shows the data about the number of pipes and the time taken to fill the same tank.

No. of. pipes x	2	3	6	9
Time Taken y (in mins)	45	30	15	10

Draw the graph for the above data and hence

(i) Find the time taken to fill the tank when **five pipes** are used.

(ii) Find the number of pipes when the **time is 9 minutes**.

5. A School announces that for a certain competitions, the cash price will be distributed for all the participants equally as show below

No. of. Participants (x)	**2**	**4**	**6**	**8**	**10**
Amount for each Participants y (in ₹)	**180**	**90**	**60**	**45**	**36**

(i) Find the **constant of variation**.

(ii) Graph the above data and hence, find how will each participants get if the number of **participants are 12.**

QUADRATIC EQUATION GRAPH

I. NATURE OF SOLUTION SUM (GRAPH CURVE OR PARABOLA 'U' LINE)

1. Discuss the nature of solutions of the following quadratic equations.

(i) $x^2 + x - 12 = 0$ **(ii)** $x^2 - 8x + 16 = 0$ **(iii)** $x^2 + 2x + 5 = 0$

2. Graph the following quadratic equations and state the nature of solutions.

(i) $x^2 - 9x + 20 = 0$ **(ii)** $x^2 - 4x + 4 = 0$ **(iii)** $x^2 + x + 7 = 0$ **(iv)** $x^2 - 9 = 0$

(v) $x^2 - 6x + 9 = 0$ **(vi)** $(2x - 3)(x + 2) = 0$

II. GRAPHICALLY SOLVE THE EQUATION SUM (GRAPH CURVE OR PARABOLA 'U' LINE)

1. Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$.

2. Draw the graph of $y = x^2 + 4x + 3$ and hence solve $x^2 + x + 1 = 0$.

3. Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.

4. Draw the graph of $y = x^2 - 4x + 3$ and hence solve $x^2 - 6x + 9 = 0$.

5. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$.

6. Draw the graph of $y = x^2 + x$ and hence solve $x^2 + 1 = 0$.

7. Draw the graph of $y = x^2 + 3x + 2$ and hence solve $x^2 + 2x + 1 = 0$.

8. Draw the graph of $y = x^2 + 3x - 4$ and hence solve $x^2 + 3x - 4 = 0$.

9. Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$.

10. Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$.

11. Draw the graph of $y = (x - 1)(x + 3)$ and hence solve $x^2 - x - 6 = 0$.

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