10 TH MATHS GEOMETRY & GRAPH

COMPLETE QUESTION BANK EM 2024-2025

SIMILAR TRIANGLE

Example : 4.10.

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** $\frac{3}{5} < 1$).

Example : 4.11.

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** $\frac{7}{4} > 1$).

EXERCISE : 4.1

10. 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** $\frac{2}{3} < 1$).

11. 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** $\frac{4}{5} < 1$).

12. 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** $\frac{6}{5} > 1$).

13. 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

Example 4.29

Draw a circle of **radius 3 cm**. Take a point P on this circle and draw **a tangent at P**.

Example 4.30

Draw a circle of **radius 4 cm**. At a point L on it draw a **tangent** to the circle using the **alternate segment**.

Example 4.31

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.

EXERCISE : 4.4

11. Draw a tangent at any point R on the circle of **radius 3.4 cm** and centre at **P**?.

12. 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.**

13. 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.

14. 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.

15. 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**.
16. 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

Example : 4.17

Construct a Δ PQR 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**.

Example : 4.18

Construct a Δ PQR in which such that $QR = 5$ **cm**, $\angle P = 30^{\circ}$ and the **Altitude** from P to **QR is of length 4.2 cm**.

Example : 4.19

Draw a triangle Δ ABC of base $BC = 8$ **cm**, $\angle A = 60^{\circ}$ and the **Bisector** of $\angle A$ meets BC at D such that **BD = 6 cm.**

EXERCISE : 4.2

11. Construct a Δ PQR in which base $PQ = 4.5$ **cm**, $\angle R = 35^{\circ}$ and the **Median RG** from R to **PQ is 6 cm**.
12. Construct a Δ PQR 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.
13. Construct a Δ PQR 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**
14. Construct a Δ PQR in which such that $QR = 5.5$ **cm**, $\angle P = 25^{\circ}$ and the **Altitude** from P to **QR is of length 4 cm**.
15. Draw a triangle Δ ABC 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.**
16. Draw a triangle Δ PQR 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

Example: 3.47: **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

Example: 3.48 : 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.

Example: 3.49 : 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?.

Example: 3.48 : 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**.

EXERCISE 3.15

1. 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.**

2. Draw the graph of $\boldsymbol{xy = 24, x, y > 0}$. Using the graph find,

(i) y when $\boldsymbol{x = 3}$ and (ii) x when $\boldsymbol{y = 6.}$

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

(i) y when $\boldsymbol{x = 9}$ and (ii) x when $\boldsymbol{y = 7.5}$.

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.**

6. 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**.

QUADRATIC GRAPH

Example: 3.51: Discuss the nature of solutions of the following quadratic equations.

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

Example: 3.52: Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$.

Example: 3.53: Draw the graph of $y = x^2 + 4x + 3$ and hence solve $x^2 + x + 1 = 0$.

Example: 3.54: Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.

Example: 3.55: Draw the graph of $y = x^2 - 4x + 3$ and hence solve $x^2 - 6x + 9 = 0$.

EXERCISE 3.16

1. 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) $(2x - 3)(x + 2) = 0$

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

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

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

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

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

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

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

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