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MATHS

GEOMETRY & GRAPH

Question Bank: 2020 -21

Compiled By: M.PALANIYAPPAN, Graduate Teacher (Maths)
Ramanathan Chettiar Municipal High School,
KARAIKUDI, SVG Dist. Mobile: 9942904874

GEOMETRY – Constructions

I. SIMILAR TRIANGLES :- (Big to Small)

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 $\frac{3}{5} < 1$) HY_19

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 $\frac{2}{3}$)

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 $\frac{4}{5}$)

II. SIMILAR TRIANGLES :- (Small to Big)

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

5. 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 $\frac{6}{5}$) PTA_1 SEP_20

6. 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 $\frac{7}{3}$)

III. TRIANGLES :- (When **MEDIAN** is given)

7. Construct a ΔPQR in which $PQ = 8$ cm, $\angle R = 60°$ and the **median** RG from R to PQ is 5.8 cm. Find the length of the ***altitude*** from R to PQ. PTA_3

8. Construct a ΔPQR in which $QR = 5$ cm, $\angle P = 40°$ and the **median** PG from P to QR is 4.4 cm. Find the length of the ***altitude*** from P to QR.

9. Construct a ΔPQR in which the base $PQ = 4.5$ cm, $\angle R = 35°$ and the **median** from R to PQ is 6 cm.

IV. TRIANGLES :- (When **ALTITUDE** is given)

10. Construct a triangle ΔPQR such that $QR = 5\,cm$, $\angle P = 30°$ and the **altitude** from P to QR is of length 4.2 cm. **PTA_5**

11. Construct a ΔPQR such that $QR = 6.5\,cm$, $\angle P = 60°$ and the **altitude** from P to QR is of length 4.5 cm.

12. Construct a triangle ΔABC such that $AB = 5.5\,cm$, $\angle C = 25°$ and the **altitude** from C to AB is 4 cm.

V. TRIANGLES :- (When the point of **ANGLE BISECTOR** is given)

13. Draw a triangle ABC of base $BC = 8$ cm, $\angle A = 60°$ and the **bisector** of $\angle A$ meets BC at D such that $BD = 6$ cm. **GMQ**

14. Draw a triangle ABC of base $BC = 5.6$ cm, $\angle A = 40°$ and the **bisector** of $\angle A$ meets BC at D such that $CD = 4$ cm.

15. Draw ΔPQR such that $PQ = 6.8$ cm, vertical angle 50° and the **bisector** of the vertical angle meets the base at D where $PD = 5.2$ cm. **PTA_4**

VI. TANGENTS TO A CIRCLE: (Using the Centre)

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

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

VII. TANGENTS TO A CIRCLE: (Using Alternate Segment Theorem)

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

19. 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**.

VIII. TANGENTS TO A CIRCLE: (Pair of Tangents or Two Tangents)

20. 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. **PTA_6**

21. **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. **SEP_20**

22. **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.

23. 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 the point. **PTA_2**

24. **Draw a tangent** to the circle from the point P having radius 3.6 cm, and centre at O point P is at a distance 7.2 cm from the centre. **HY_19**

GRAPH

I. GRAPH of VARIATION :- (Direct Variation)

1. Varshika drew 6 circles with different sizes. Draw a graph for the relationship betweem the diameter and circumference of each circle (approximately) 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
   (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 Rs.3250 (from Graph)
   (ii) the discount when the marked price is Rs.2500

4. Graph the following linear function $y = \frac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also, (i) find y when $x = 9$ (ii) find x when $y = 7.5$

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

Time (in hours) (x)	4	8	12	24
Amount Rs. (y)	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 Rs.150.

II. GRAPH of VARIATION :- (Inverse Variation)

6. 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 decided to opt for 120 workers?
   (iii) If the work has to be completed by 200 days, how many workers are required?

7. Nishanth is the winner in a Marathan race of 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/kr. And, they have covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hrs respectively. Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr.

8. Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find, (i) y when $x = 3$ and (ii) find x when $y = 6$.

9. 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 (in min) (y)	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

10. A school announces that for a certain competitions, the cash price will be distributed for all the participants equally as shown below

No. of participants (x)	2	4	6	8	10
Amount for each participant in Rs. (y)	180	90	60	45	36

(i) Find the constant of variation.
(ii) Graph the above data. Hence, find how much will each participant get if the number of participants are 12.

III. NATURE of the SOLUTIONS :- (Graphically)

Discuss the **nature of solutions** of the following **quadratic equations**

11. $x^2 + x - 12 = 0$ 12. $x^2 - 8x + 16 = 0$ SEP_20 13. $x^2 + 2x + 5 = 0$

Graph the following **quadratic equations** and state its **nature of solutions:**

14. $x^2 - 9x + 20 = 0$ HY_19 15. $x^2 - 4x + 4 = 0$ 16. $x^2 + x + 7 = 0$

17. $x^2 - 9 = 0$ 18. $x^2 - 6x + 9 = 0$ 19. $(2x - 3)(x + 2) = 0$

IV. Solving QUADRATIC EQUATIONS :- (Through intersection of lines)

20. Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$. PTA_4
21. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$.
22. Draw the graph of $y = x^2 + 4x + 3$ and hence find the roots of $x^2 + x + 1 = 0$.
23. Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$. PTA_1 HY_19
24. Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$.
25. Draw the graph of $y = x^2 + x$ and hence solve $x^2 + 1 = 0$.
26. Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$. PTA_5
27. Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$. GMQ
28. Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$. PTA_2 PTA_6
29. Draw the graph of $y = 2x^2 - 3x - 5$ and hence use it to solve $2x^2 - 4x - 6 = 0$ PTA_3 SEP_2
30. Draw the graph of $y = (x - 1)(x + 3)$ and hence use it to solve $x^2 - x - 6 = 0$