Applied Academy

H-76 Sec 22

WORKSHEET TRIANGLES AND COORDINATE GEOMETRY

Class 10 - Mathematics

1. In △LMN and $\triangle PQR, \angle L = \angle P, \angle N = \angle R$ and MN = 2QR. Then the two triangles are **[1]**

   a) Similar but not congruent
   b) Congruent but not similar
   c) Congruent as well as similar
   d) neither congruent nor similar

2. In a △ABC, AD is the bisector of ∠BAC. lt AB = 6 cm, AC = 5 cm and BD = 3 cm, then DC = **[1]**

   a) 11.3 cm
   b) 4.5 cm
   c) 3.5 cm
   d) 2.5 cm

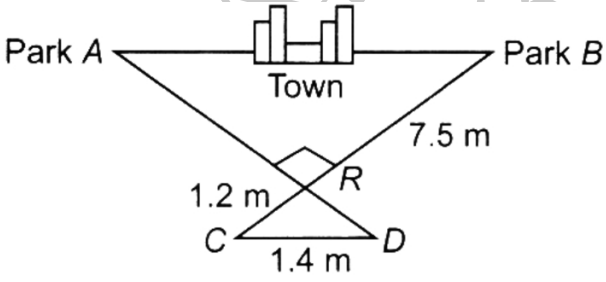
3. A street light is fixed on a pole 6 m above the ground. If a woman of height 1.5 m casts a shadow of 3, then distance between her and the base of the pole is _____ **[1]**

   a) 12 m
   b) 9 m
   c) 8 m
   d) 10 m

4. △ABC is such that AB = 3 cm, BC = 2 cm and CA = 2.5 cm. If $\triangle DEF \sim \triangle ABC$ and EF = 4 cm, then perimeter of △DEF is **[1]**

   a) 30 cm
   b) 15 cm
   c) 22.5 cm
   d) 7.5 cm

5. A construction company wants to connect two parks on opposite sides of town with a road. Surveyors have laid out a map as shown. The road can be built through the town or around town through point R. The roads intersect at a right angle at point R. The line joining Park A to Park B is parallel to the line joining C and D. **[1]**



   i. What is the distance between the parks through town?
   ii. What is the distance from Park A to Park B through point R?

   a) (i) 9 m, (ii) 13 m
   b) (i) 8.75 m, (ii) 12 m
   c) (i) 8 m, (ii) 12.5 m
   d) (i) 9 m, (ii) 14 m

6. In △ABC, it is given that AB = 9 cm, BC = 6 cm and CA = 7.5 cm. Also, △DEF is given such that EF = 8 cm and △DEF ~ △ABC. Then, perimeter of △DEF is **[1]**

   a) 30 cm
   b) 22.5 cm

c) 27 cm d) 25 cm

7. If △ABC and △DEF are similar such that 2 AB = DE and BC = 8cm, then EF = **[1]**

a) 16 cm b) 8 cm

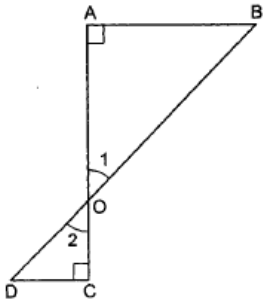
c) 12 cm d) 4 cm

8. In △ABC, D and E are points on side AB and AC respectively such that DE || BC and AD : DB = 3 : 1. If EA = 3.3 cm, then AC = **[1]**

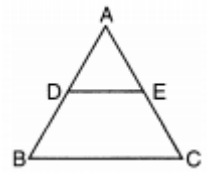
a) 1.1 cm b) 5.5 cm

c) 4 cm d) 4.4 cm

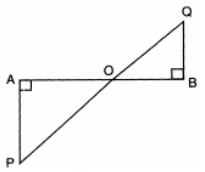
9. In Fig. if $\angle A = \angle C$, then prove that $\Delta AOB \sim \Delta COD$. **[1]**



10. In given figure DE || BC. If AD = 3 cm, DB = 4 cm and AE = 6 cm, then find EC. **[1]**

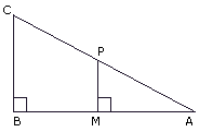


11. In the given figure, if $\angle A = 90^o$, $\angle B = 90^o$, OB = 4.5 cm, OA = 6 cm and AP = 4 cm, then find QB. **[1]**



12. Each side of an equilateral triangle measures 10 cm. Find (i) the area of the triangle and (ii) the height of the triangle. [Given, $\sqrt{3}$ = 1.732.] **[1]**

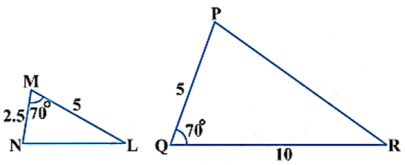
13. In the given figure, ABC and AMP are two right-angled triangles, right angled at B and M respectively, prove that: **[2]**



i. ABC ~ △ AMP

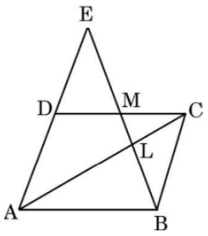
ii. $\frac{BC}{MP} = \frac{CA}{PA}$

14. State the pair of triangles in the figure below are similar. Write the similarity criterion used by you for answering the question and also write the pair of similar triangles in the symbolic form: **[2]**

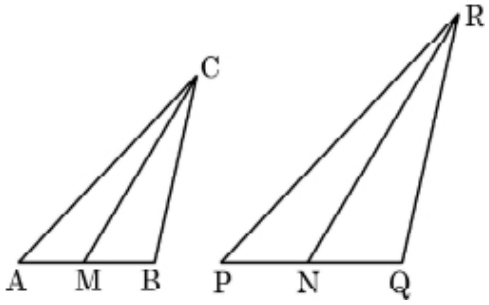


15. In △PQR, if S and T are two points on the sides PQ and PR respectively such that PS = 2.4 cm, SQ = 7.2 cm, PT = 1.8 cm and TR = 5.4 cm, then state whether ST||QR or not. **[2]**

16. In the given figure, ABCD is a parallelogram. BE bisects CD at M and intersects AC at L. Prove that EL = 2BL. **[2]**

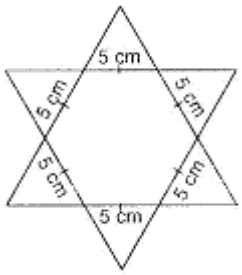


17. **[2]**



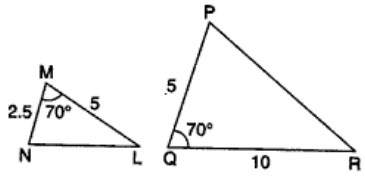
In the given figure, CM and RN are respectively the medians of △ABC and △PQR. If △ABC ∼ △PQR, then prove that △AMC ∼ △PNR.

18. Complete the star by filling them with as many equilateral triangles of side 1 cm as you can. Count the number of triangles in each case. **[2]**

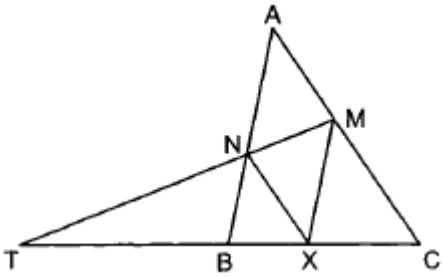


19. △ABD is a right triangle right-angled at A and AC⊥ BD. Show that $\frac{AB^2}{AC^2} = \frac{BD}{DC}$ **[2]**

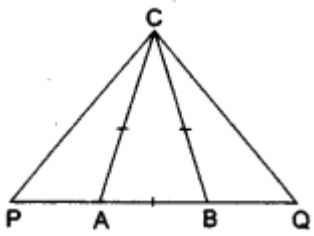
20. State whether the pairs of triangles in the figure are similar or not. Write the similarity criterion used for answering the question and also write the pairs of similar triangles in the symbolic form. **[2]**



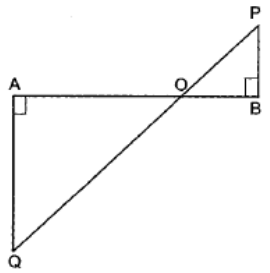
21. Let X be any point on the side BC of a triangle ABC. If XM, XN are drawn parallel to BA and CA meeting CA, BA in M, N respectively; MN meets BC produced in T, prove that $TX^2 = TB \times TC$. **[3]**



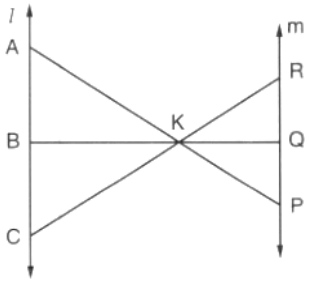
22. In an isosceles, $\triangle ABC$ the base AB is produced both ways in P and Q such that $AP \times BQ = AC^2$ Prove that $\triangle ACP \sim \triangle BCQ$. **[3]**



23. In Fig. QA and PB are perpendiculars to AB. If AO = 10 cm, BO = 6 cm and PB = 9 cm. Find AQ. **[3]**



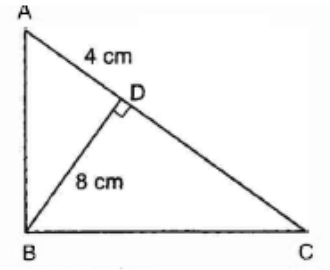
24. In given figure, l || m **[3]**



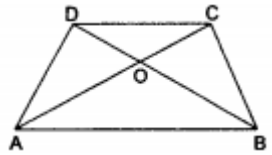
i. Name three pairs of similar triangles with proper correspondence; write similarities.

ii. Prove that $\frac{AB}{PQ} = \frac{AC}{PR} = \frac{BC}{RQ}$

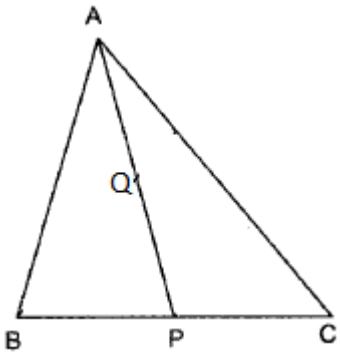
25. In Fig. ∠ABC= 90° and $BD \perp AC$. If BD = 8 cm and AD= 4 cm, find CD. **[3]**



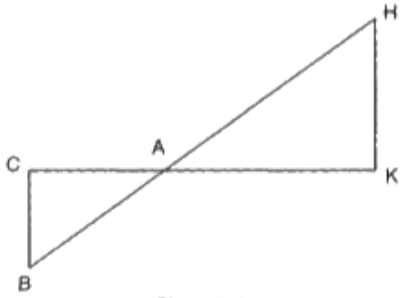
26. In the adjoining figure, ABCD is a trapezium in which $CD \| AB$ and its diagonals intersect at O. If AO = (5x - 7) cm, OC = (2x+1)cm, DO = (7x- 5) cm and OB = (7x + 1)cm, find the value of x. **[3]**



27. In Fig. P is the mid-point of BC and Q is the mid-point of AP. If BQ, when produced meets AC at R, prove that RA = $\frac{1}{3}$ CA. **[3]**



28. In Fig. ΔAHK is similar to ΔABC. If AK = 10 cm, BC = 3.5 cm and HK = 7 cm, find AC. **[3]**

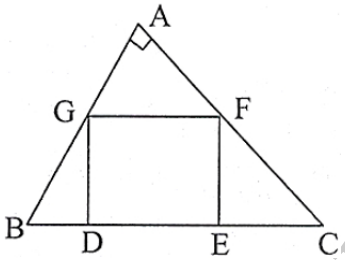


29. In Fig., DEFG is a square in a triangle ABC right angled at A. **[5]**

Prove that

i. $\triangle AGF \sim \triangle DBG$

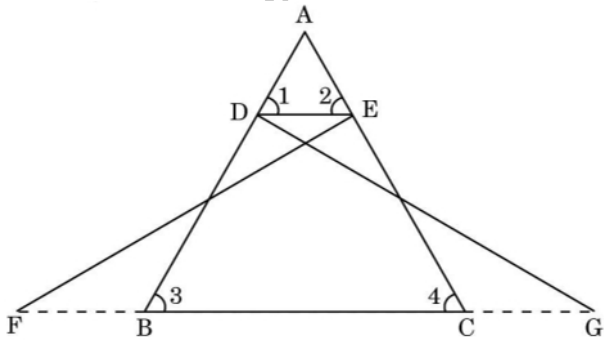
ii. $\triangle AGF \sim \triangle EFC$



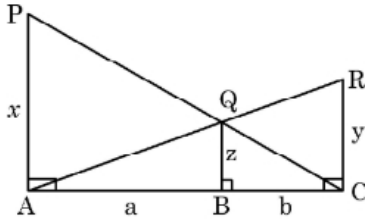
30. Prove that in a right angled triangle the square on the hypotenuse is equal to sum of the squares on other two sides. **[5]**

Using the above, prove that the sum of squares on the sides of a rhombus is equal to sum of squares on its diagonals.

31. In the given figure, $\triangle FEC \cong \triangle GDB$ and $\angle 1 = \angle 2$. Prove that $\triangle ADE \sim \triangle ABC$. **[5]**

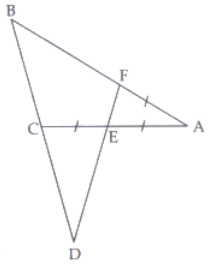


32. PA, QB and RC are each perpendicular to AC. If AP = x, QB = z, RC = y, AB = a and BC = b, then prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$. **[5]**



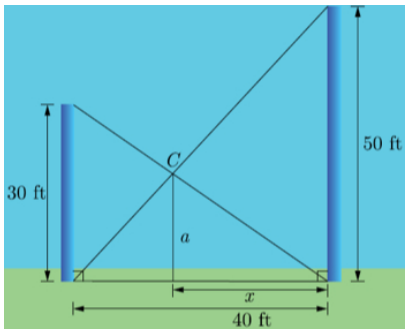
33. In the given figure, line segment DF intersect the side AC of a triangle △ABC at the point E such that E is the mid–point of CA and ∠AEF = ∠AFE. Prove that: $\frac{BD}{CD} = \frac{BF}{CE}$. **[5]**

[Hint: Take point G on AB such that CG ‖ DF.]



34. **Read the following text carefully and answer the questions that follow:** **[4]**

Two poles, 30 feet and 50 feet tall, are 40 feet apart and perpendicular to the ground. The poles are supported by wires attached from the top of each pole to the bottom of the other, as in the figure. A coupling is placed at C where the two wires cross.



i. What is the horizontal distance from C to the taller pole? (1)

ii. How high above the ground is the coupling? (1)

iii. How far down the wire from the smaller pole is the coupling? (2)

OR

Find the length of line joining the top of the two poles. (2)

35. **Assertion (A):** A line drawn parallel to any one side of a triangle intersects the other two sides in the same ratio. **[1]**

Reason (R): Parallel lines cannot be drawn to any side of a triangle.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

36. **Assertion (A):** D and E are points on the sides AB and AC respectively of a △ABC such that AB = 10.8 cm, AD = 6.3 cm, AC = 9.6 cm and EC = 4 cm then DE is parallel to BC. **[1]**

Reason (R): If a line is parallel to one side of a triangle then it divides the other two sides in the same ratio.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

37. If the distance between the points (3, -5) and (x, -5) is 15 units, then the values of x are: **[1]**

a) -9, -12

b) 12, -18

c) 18, 5

d) -12, 18

38. The mid-point of the line segment joining the points A (-2, 8) and B (- 6, - 4) is **[1]**

a) (- 4, -6)

b) (4, 2)

c) (2, 6) d) (– 4, 2)

39. The distance of the point P (2, 3) from the x-axis is **[1]**

a) 3 b) 1

c) 2 d) 5

40. The distance between the points A(5, -4) and B(4, -5) is **[1]**

a) 1 unit b) $9\sqrt{2}$ units

c) 2 units d) $\sqrt{2}$ units

41. The distance between the points (-1, -3) and (5, -2) is: **[1]**

a) $\sqrt{17}$ units b) $\sqrt{37}$ units

c) $\sqrt{61}$ units d) 5 units

42. If three points (0,0), (3, $\sqrt{3}$) and (3, λ) form an equilateral triangle, then λ = **[1]**

a) -4 b) None of these

c) -3 d) 2

43. If P is a point on x-axis such that its distance from the origin is 3 units, then the coordinates of a point Q on OY such that OP = OQ, are **[1]**

a) (0, 0) b) (0, -3)

c) (0, 3) d) (3, 0)

44. The perimeter of the triangle formed by the points (0, 0), (1, 0) and (0, 1) is **[1]**

a) $2+\sqrt{2}$ b) 3

c) $\sqrt{2}+1$ d) $1 \pm \sqrt{2}$

45. Find the ratio in which a line segment joining points (1, - 4) and (6, 5) is divided by the x-axis. **[1]**

46. Find the distance between the points A $\left(-\frac{7}{3}, 5\right)$ and B $\left(\frac{2}{3}, 5\right)$. **[1]**

47. In what ratio is the line segment joining the points P(3, – 6) and Q(5, 3) divided by x-axis? **[1]**

48. Find the ratio in which the point (-1, k) divides the line segment joining the points (-3, 10) and (6, -8). Hence, find the value of k. **[1]**

49. If the coordinates of one end of diameter of circle are (2,3) and the coordinates of its centre are (-2,5). Find the coordinates of the other end of the diameter. **[2]**

50. Check whether the points P(5, -2), Q(6, 4) and R(7, -2) are the vertices of an isosceles triangle PQR. **[2]**

51. Find the ratio in which line formed by joining (-1, 1) and (5, 7) is divided by the line x + y = 4. **[2]**

52. Find the coordinates of the point which divides the join of A(-1, 7) and B(4, -3) in the ratio 2 : 3. **[2]**

53. Prove that the coordinates of the centroid of a triangle ABC, with vertices A(x_1, y_1), B(x_2, y_2) and C(x_3, y_3) are given by $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$. **[2]**

54. Find the points on the x-axis, each of which is at a distance of 10 units from the point A(11, -8). **[2]**

55. Find the distance between the points (0, 0) and (36, 15). **[2]**

56. Find the coordinates of the point where the diagonals of the parallelogram formed by joining the points (-2, -1), (1, 0), (4, 3) and (1, 2) meet. **[2]**

57. If the point P (2, 2) is equidistant from the points A (-2, k) and B (-2k, -3), find k. Also, find the length of AP. **[3]**

58. Using the distance formula, show that the given points are collinear (-1, -1), (2, 3) and (8, 11) **[3]**

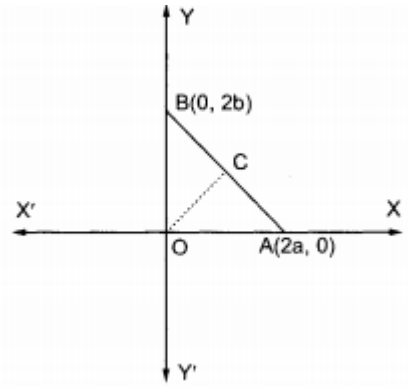
59. If the points P, Q(x, 7), R, S(6, y) in this order divide the line segment joining A(2, p) and B (7, 10) in 5 equal parts, find x, y and p. **[3]**

60. The centre of a circle is (2a -1 ,7) and it passes through the point (- 3, -1). If the diameter of the circle is 20 units, then find the value of a. **[3]**

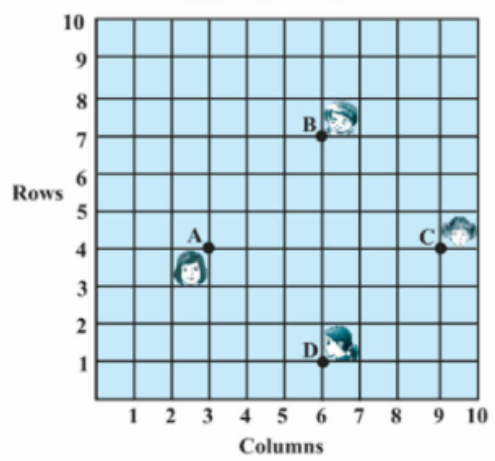
61. Name the type of triangle formed by the points A (-5, 6), B (-4, -2) and C (7, 5). **[3]**

62. Find a point which is equidistant from the points A (-5,4) and B (-1,6). How many such points are there? **[3]**

63. A right triangle BOA is given. C is the mid-point of the hypotenuse AB. Show that it is equidistant from the vertices O, A and B. **[3]**



64. In a class room, 4 friends are seated at the points A, B, C and D as shown in Figure **[3]**



i. Find the positions of the four friends.

ii. Find far apart the four friends are from each other.

iii. Jarina and Phani walk into the class and after observing for a few minutes Jarina asks Phani "Don't you notice that ABCD is a square?" Phani disagrees. Using distance formula, find which of them is correct. Why?

65. If the coordinates of the mid-points of the sides of a triangle are (1, 1), (2, -3) and (3,4), find the vertices of the triangle. **[5]**

66. Points P, Q and R in order are dividing a line segment joining A(1, 6) and B(5, -2) in four equal parts. Find the coordinates of P, Q and R. **[5]**

67. If two opposite vertices of a square are (5, 4) and (1, -6), find the coordinates of its remaining two vertices. **[5]**

68. Find the value of a when the distance between the points (3, a) and (4,1) is $\sqrt{10}$. **[5]**

69. A(0, 3), B (-1, -2) and C(4, 2) are vertices of a $\triangle$ABC. D is a point on the side BC such that $\frac{BD}{DC} = \frac{1}{2}$. P is a point on AD such that AP $= \frac{2\sqrt{5}}{3}$ **[5]**

70. **Read the following text carefully and answer the questions that follow:** **[4]**

To raise social awareness about the hazards of smoking, a school decided to start a 'No smoking' campaign. 10 students are asked to prepare campaign banners in the shape of a triangle. The vertices of one of the triangles are

P(-3, 4), Q(3, 4) and R(-2, -1).

i. What are the coordinates of the centroid of △PQR? (1)

ii. If T be the mid-point of the line joining R and Q, then what are the coordinates of T? (1)

iii. If U be the mid-point of line joining R and P, then what are the coordinates of U? (2)

OR

What are the coordinates of centroid of △STU? (2)

71. **Assertion (A):** C is the mid-point of PQ, if P is (4, x), C is (y, -1) and Q is (-2, 4), then x and y respectively are -6 and 1. **[1]**

Reason (R): The mid-point of the line segment joining the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

72. **Assertion (A):** Point A is on the y-axis at a distance of 4 units from the origin. If the coordinates of the point B are (-3, 0), then the length of AB is 5 units. **[1]**

Reason (R): Distance between points A(x_1, y_1) and B(x_2, y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.