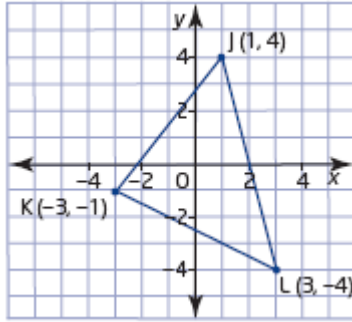


MPM 2DI EXAM REVIEW – Chapter 2: Analytic Geometry and Chapter 3: Geometric Properties

Use $\triangle JKL$ for Questions 1 and 2.



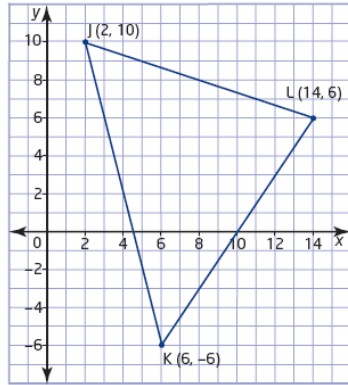
1. Using the appropriate formulas learned in class, find the coordinates of the midpoint and the length of each line segment in $\triangle JKL$. Classify $\triangle JKL$ as isosceles, scalene or equilateral. Explain.
2. For $\triangle JKL$, find an equation of the line that contains the...
 - (a) the median from vertex J
 - (b) the median from vertex K
 - (c) the right bisector of side JL.
3. On a street map, the coordinates of the two fire stations in a town are A(10, 63) and B(87, 30). A neighbour reports smoke coming from the kitchen of a house at C(41, 18). Which fire station is closer to this house?
4. Use analytic geometry to classify the quadrilateral with vertices J(-2, 1), K(2, 3), L(4, -1) and N(0, -3). Explain your reasoning and show all your work.
5.
 - (a) Draw the triangle with vertices J(2, 10), K(6,-6), and L(14,6).
 - (b) Calculate the coordinates of the midpoint, M, of side JK and the coordinates of the midpoint, N, of side JL.
 - (c) Show that MN is half the length of KL.
 - (d) Show that MN is parallel to KL.
6. Does the point P(-3,-2) lie on the right bisector of the line segment with endpoints Q(-2,5) and R(4,1)? Show your work.
7. Find an equation for each circle centred at the origin and passing through the point

(a) J(0,7)	(b) K(5,6)	(c) $(8, \sqrt{3})$
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8. Find the diameter and area of the circle defined by $x^2 + y^2 = 64$.
9. What is the centroid of a triangle? Describe how to use analytic geometry to find the coordinates of the centroid of a triangle, if you are given the coordinates of the three vertices.
10. Verify that $\triangle DEF$ is a right triangle, given that $D(2,14)$, $E(8,4)$ and $C(18,10)$
11. Find the midpoint of $\left(\frac{-1}{2}, 2\right)$ and $\left(3, \frac{2}{3}\right)$. (No decimals)
12. If the midpoints of adjacent sides of a rhombus are joined, what type of parallelogram is the inner (Varignon) parallelogram?
13. Find an equation for each of the right bisectors of the sides of $\triangle JKL$, where J(1,2), K(9,8) and L(5,0).
14. Find the centre of the circle that passes through the three non-collinear points: P(9,-3), Q(8,6) and R(-1, 5).

FINAL ANSWERS

- midpoint JK $(-1, \frac{3}{2})$, midpoint KL $(0, \frac{-5}{2})$, midpoint JL $(2,0)$; $\overline{KL} = 3\sqrt{5}$ units, $\overline{JL} = 2\sqrt{17}$ units, $\overline{JK} = \sqrt{41}$ units. It is scalene since $\overline{KL} \neq \overline{JL} \neq \overline{JK}$
- a) $y = 6.5x - 2.5$ b) $y = 0.2x - 0.4$ c) $y = \frac{1}{4}x - \frac{1}{2}$
- Fire station B is closer since $\overline{AC} > \overline{BC}$.
- It is a square, since it is a quadrilateral with adjacent sides that are perpendicular (slopes of adjacent sides are negative reciprocals of each other), in addition to all sides being the exact same length.

5. a)



b) M(4,2) and N(8,8)

c) $\overline{MN} = 2\sqrt{13}$, $\overline{KL} = 4\sqrt{13}$. Since $\overline{KL} = 2\overline{MN}$, MN is half of KL.

d) Since $m_{MN} = \frac{3}{2} = m_{KL}$, $MN \parallel KL$

6. No. (SHOWYOUR WORK)

7. a) $x^2 + y^2 = 49$ b) $x^2 + y^2 = 61$ c) $x^2 + y^2 = 67$

8. The diameter is 16 units. The area of the circle is about 201 square units.

9. The centroid is the point where the three medians of a triangle intersect. Determine the equation of two of the medians of the triangle and then find the point of intersection of these two lines.

10. Since the slopes of DE and EF are negative reciprocals, $DE \perp EF$. Hence, $\triangle DEF$ is a right triangle.

11. $(\frac{5}{4}, \frac{4}{3})$

12. A rectangle.

13. The equation of the right bisector of JL is $y = 2x - 5$. The equation of the right bisector of LK is $y = -\frac{1}{2}x + \frac{15}{2}$.

The equation of the right bisector of JK is $y = -\frac{4}{3}x + \frac{35}{3}$.

14. The centre is (4,1)