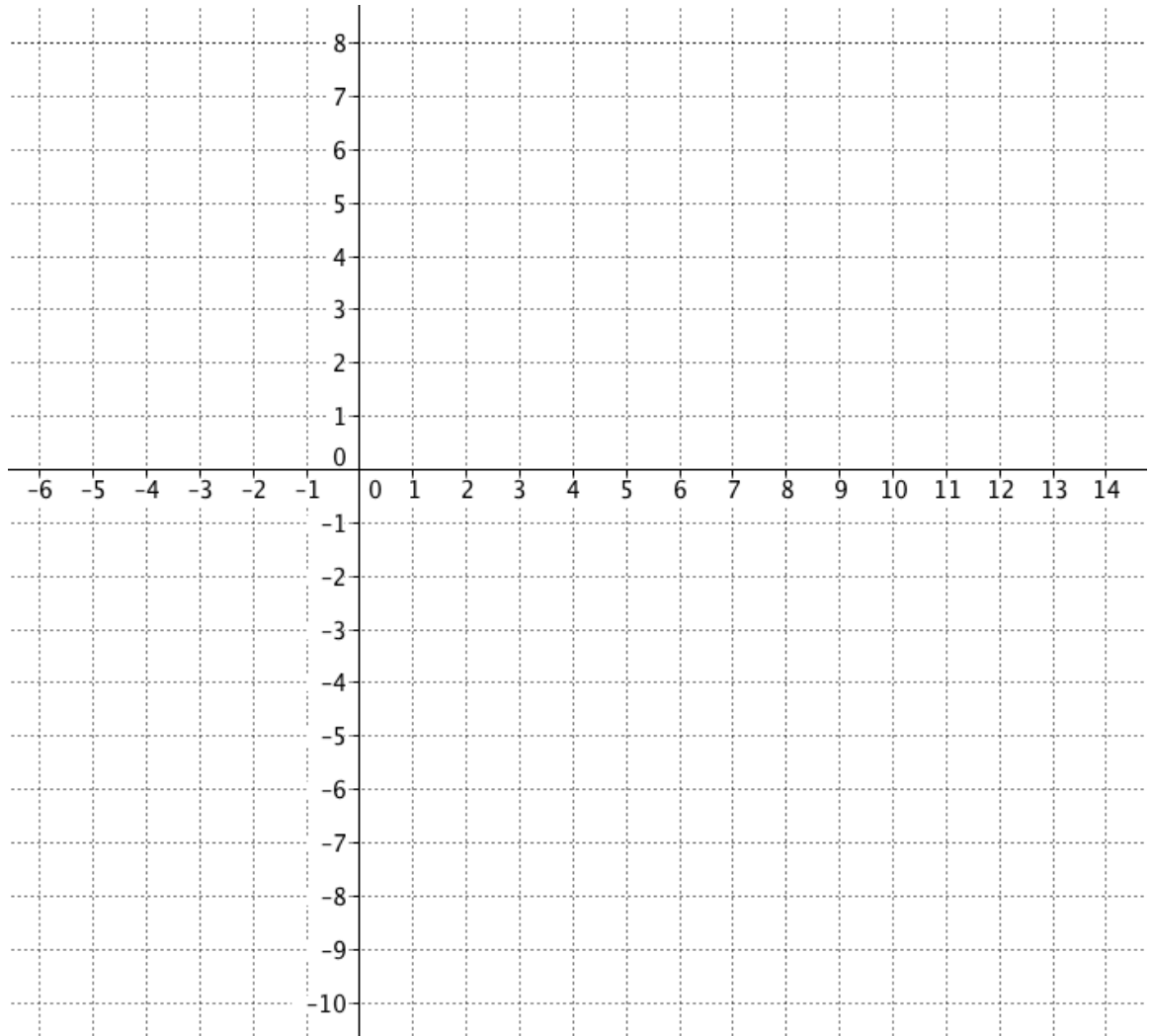


# MPM2D – Unit 7: Analytical Geometry

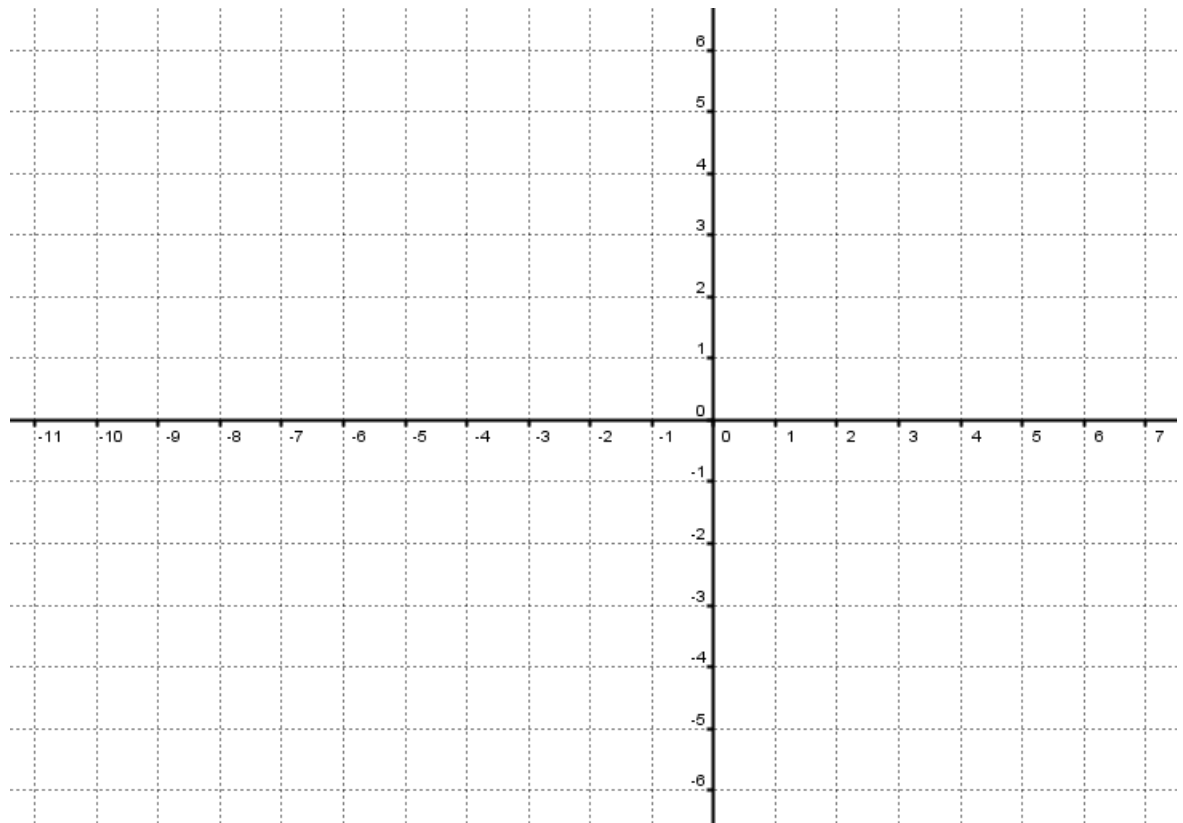
## Review Worksheet

### Section 1 – Mixed Review

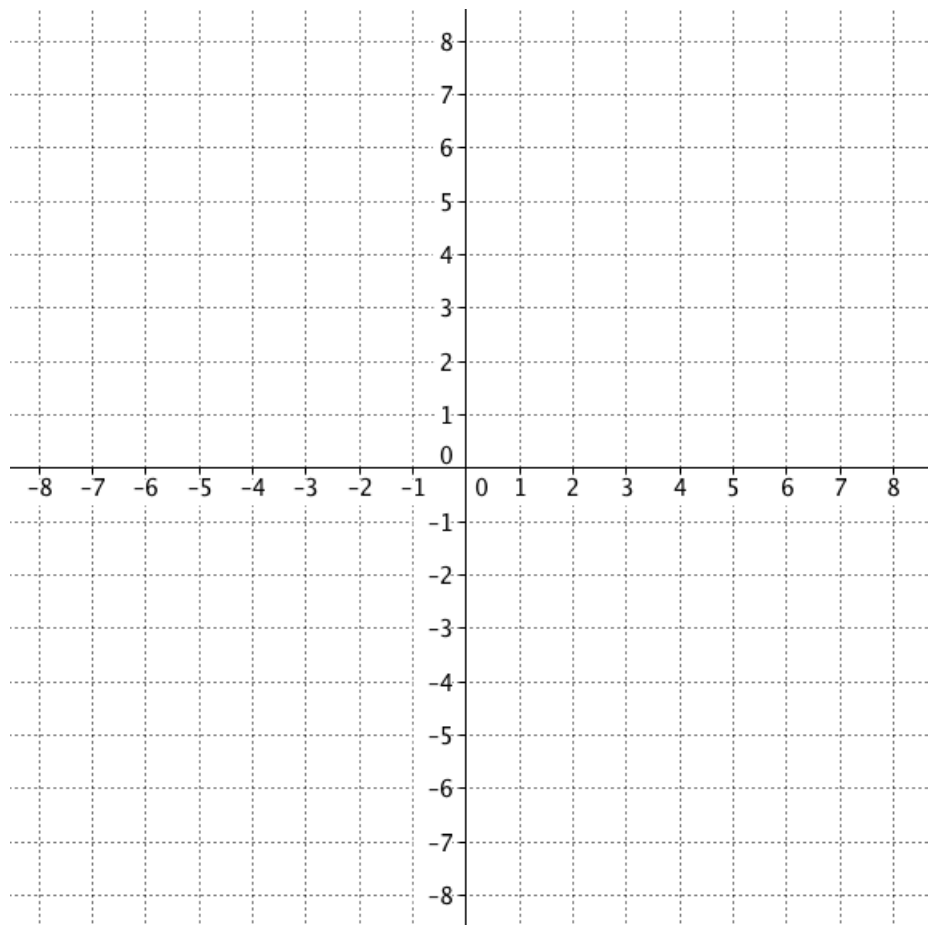
1. A circle has a diameter with endpoints at  $(-5, 2)$  and  $(13, -4)$ . Determine the centre of the circle and six other points on the circumference of the circle.



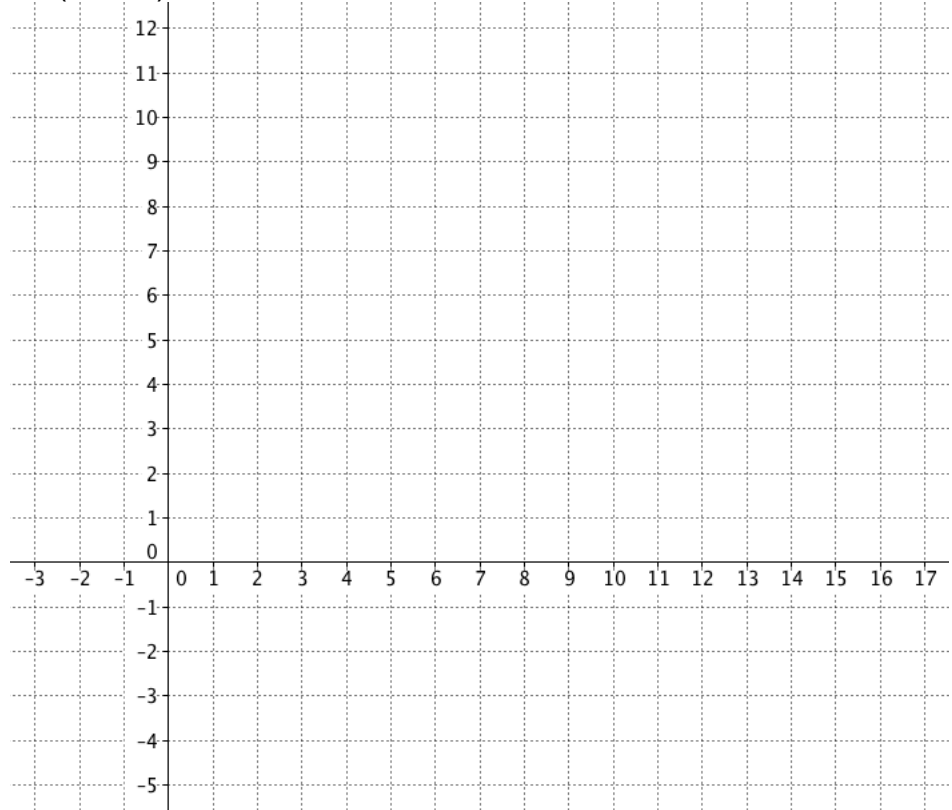
2. Determine the area of the triangle with vertices P (7, 5), Q (4, -6), and R (-11, 4) if  $PQ = \sqrt{130}$ ,  $QR = \sqrt{325}$ , and  $PR = \sqrt{325}$ .



3. Determine the area of the triangle with vertices P (6, 2), Q (−8, −5), and R (−4, 7) if  $PQ = \sqrt{245}$ ,  $QR = \sqrt{160}$ , and  $PR = \sqrt{125}$ .



4. Determine the area of the trapezoid with vertices A  $(-2, 7)$ , B  $(14, -5)$ , C  $(16, 8)$  and D  $(12, 11)$ .



## Section 2 – Line Segments

5. A line segment is formed by joining the points C(1, 10) and D(5, 2).
  - a. Determine the midpoint of the line segment.
  - b. Determine the slope of the line segment.
  - c. Verify that the point (7, 8) is on the right bisector of the line segment.
6. A line segment has endpoint C(-3, 5) and midpoint M (6, -1). Determine the other endpoint.
7. A line segment has endpoint H (9, -7) and midpoint M (-1, -3). Determine the other endpoint.

## Section 3 – Circles

8. A circle is centred at the origin and passes through the point (5, 12).
  - a. Determine the radius of the circle.
  - b. Write the equation for the circle.
  - c. Determine the area of the circle.
9. Explain why the circle with the equation  $x^2 + y^2 = 36$  has a diameter of 12 units.
10. Determine whether each point below is inside or outside or on the circle with the given equation.
  - a. (-7, 4) and  $x^2 + y^2 = 64$ .
  - b. (8, -6) and  $x^2 + y^2 = 100$ .
  - c. (-2, 10) and  $x^2 + y^2 = 144$ .
11. Determine algebraically the centre of the circle that passes through J (-5, -2), K (0, 3), and L (6, 1) if the right bisector of JK is  $y = -x - 2$ .
12. Determine geometrically the centre of the circle that passes through G (1, 2), H (4, -7), and I (5, 0).
13. Determine the centre of the circle that passes through the points A(-2, -1), B(4, 3), and C(12, -1).
14. Determine the centre of a circle passing through the points A (-6, -1), B (2, 3), and C (20, -3).
15. Determine the area of a circle that has a diameter with endpoints at (8, -6) and (8, 6).

#### Section 4 – Triangles and Quadrilaterals

16. Determine the area of the triangle with vertices M  $(-4, -1)$ , N  $(7, 6)$ , and O  $(10, -3)$  if its side lengths are  $L_{MN} = \sqrt{170}$  units and  $L_{NO} = \sqrt{90}$  units and  $L_{OM} = \sqrt{200}$  units.
17. Determine the equation of the altitude from P in the triangle with P  $(-9, -7)$ , Q  $(4, 6)$  and R  $(10, -3)$ .
18. Determine the area of a right triangle has vertices S  $(-4, 8)$ , T  $(2, 6)$ , and U  $(-7, -1)$ .
19. Verify that quadrilateral A  $(-1, 2)$ , B  $(-4, 0)$ , C  $(0, -6)$ , D  $(3, -4)$  is a rectangle and then determine its area.
20. Explain how to determine if a triangle is \_\_\_\_\_ if you know the coordinates of each vertex.
  - a. Equilateral
  - b. Isosceles
  - c. Scalene
21. Explain how to determine if a quadrilateral is:
  - a. A square or a rectangle.
  - b. A rectangle or parallelogram.
22. Verify that the triangle with vertices P  $(9, 4)$ , Q  $(3, -5)$ , and R  $(-3, -1)$  is a right angle triangle. Justify your answer.
23. Verify that the triangle with vertices A  $(7, -5)$ , B  $(-1, 6)$ , and C  $(12, 2)$  is an isosceles triangle. Justify your answer.
24. Determine whether the quadrilateral with vertices D  $(-2, 3)$ , E  $(6, 7)$ , F  $(24, -20)$  and G  $(14, -25)$  is a parallelogram or a trapezoid if the slope of DE is  $\frac{4}{8}$  and the slope of EF is  $-\frac{27}{18}$ . Justify your answer.
25. Verify that the quadrilateral with vertices D  $(-8, 2)$ , E  $(20, 16)$ , F  $(32, 1)$  and G  $(6, -12)$  is a trapezoid if the slope of DE is  $\frac{14}{28}$  and the slope of EF is  $\frac{-15}{12}$ .
26. Classify the triangle with vertices A  $(-5, -5)$ , B  $(5, -7)$ , and C  $(8, 8)$  as scalene or isosceles or equilateral.
27. Verify that the quadrilateral with vertices D  $(-1, 2)$ , E  $(-4, 1)$ , F  $(2, -2)$ , and G  $(1, 1)$  is a trapezoid.

## Answer Key

### Section 1 – Mixed Review

- 1) Centre is (4, -1)
- 2)  $A = 97.5 \text{ units}^2$
- 3)  $A = 70 \text{ units}^2$
- 4)  $A = 145 \text{ units}^2$  POI for height is (5.04, 1.72)

### Section 2 – Line Segments

- 5a) M (3, 6)                                      b)  $m = -2$                                       c) R.B.  $y = \frac{1}{2}x + \frac{9}{2}$
- 6) D (15, -7)
- 7) I (-11, 1)

### Section 3 - Circles

- 8)  $r = 13 \text{ units}$                                       b)  $x^2 + y^2 = 169$                                       c)  $A = 169\pi \text{ units}^2$
- 9)  $r = 6 \text{ units}$  and  $d = 12 \text{ units}$
- 10a) outside the circleb) on the circumference                                      c) inside the circle
- 11) centre is  $\left(\frac{5}{4}, -\frac{13}{4}\right)$
- 12) centre is (1, -3)
- 13) centre is (5, -5)
- 14) centre is (6, -15)
- 15)  $A = 36\pi \text{ units}^2$

### Section 4 – Triangles and Quadrilaterals

- 16)  $A = 40 \text{ units}^2$
- 17)  $y = \frac{2}{3}x - \frac{19}{6}$
- 18)  $A = 30 \text{ units}^2$
- 19)  $A = 26 \text{ units}^2$
- 20) see solutions
- 21) see solutions
- 22)  $m_{PQ} = \frac{3}{2}$  and  $m_{QR} = -\frac{2}{3}$  : perpendicular lines means a right triangle.
- 23)  $L_{AB} = L_{BC} = \sqrt{185} \text{ units}$  : 2 equal side lengths means isosceles triangle.
- 24)  $m_{DE} = m_{FG} = \frac{1}{2}$  : 2 equal slopes means 2 parallel lines and the other 2 slopes are not equal and the lines are not parallel indicating this is a trapezoid.
- 25)  $m_{DE} = m_{FG} = \frac{1}{2}$  : 2 equal slopes means 2 parallel lines and the other 2 slopes are not equal and the lines are not parallel verifying this is a trapezoid.
- 26)  $L_{AB} \neq L_{BC} \neq L_{AC}$  : no equal side lengths is a scalene triangle.
- 27)  $m_{EF} = m_{DG} = -\frac{1}{2}$  : 2 equal slopes means 2 parallel lines and the other 2 slopes are not equal and the lines are not parallel verifying this is a trapezoid.

1. Explain why the circle with the equation  $x^2 + y^2 = 16$  has a diameter of 8 units.
2. A line segment has endpoint (3, -7) and midpoint M (-1, -2). Determine the other endpoint.
3. Verify that triangle J (2, 14), K (18, 10), L (8, 4) is a right triangle.
4. Verify that the triangle with vertices A (-4, 8) B (2, 6), and C (-7, -1) is a right angle triangle.
5. Determine whether the quadrilateral with vertices S (3, 6), T (9, 2), U (1 -6), and V (-4, -1) is a trapezoid or a parallelogram.