

PART 1 – The Basics – Show your calculations to earn full credit for your answers.

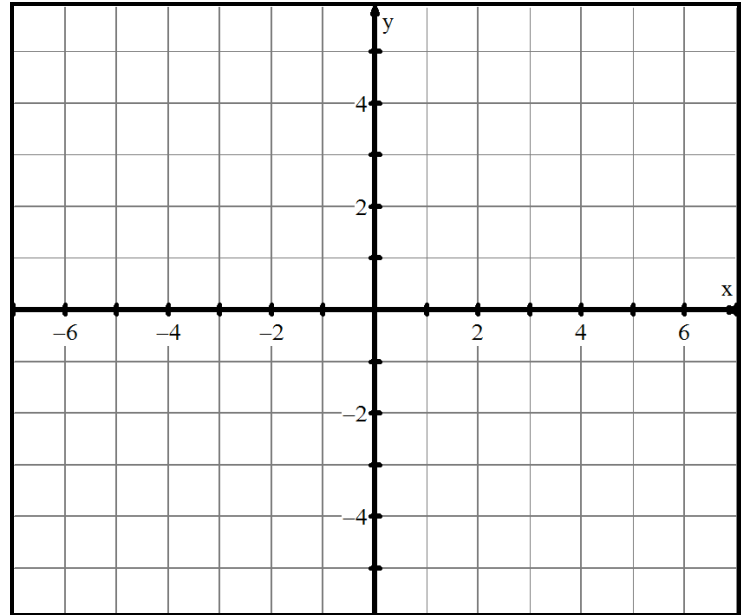
1. Given the 4 points A(-2,5), B(3,-4), C(-1,-6) and D(4,5), answer the following questions:

(10 points)

a. Graph the 4 points on the grid provided.
(2 points)

b. Calculate the midpoint of line segment AC.
(2 points)

c. Calculate the length of line segment DB.
(2 points)



d. Calculate the slope of line segment DC.
(2 points)

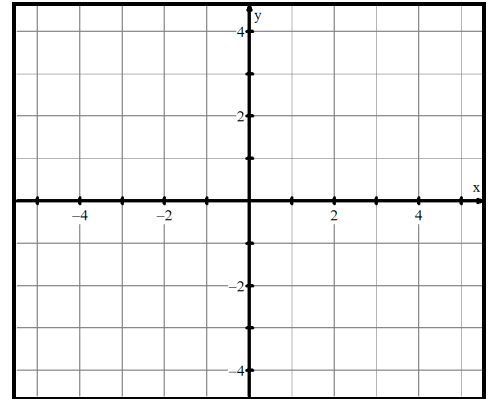
e. Explain how you that AB is/isn't parallel to CD.
(2 points)

2. A circle is centered at $(0,0)$ and has a radius of 4 units. Answer the following questions:

(8 points)

a. Determine the equation of the circle.
(2 points)

b. Determine the x- and y-intercepts of the circle.
(2 points)



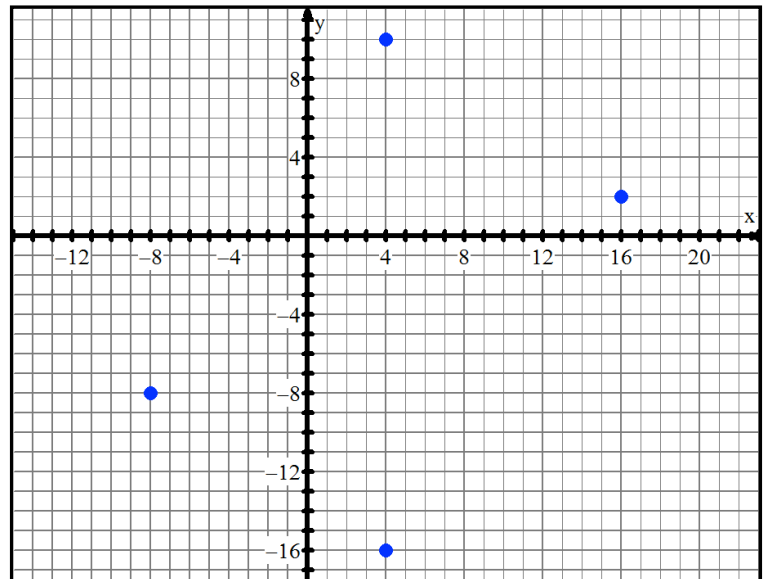
c. The domain and range of this relation.
(2 points)

d. The value(s) of x if $y = 2$.
(2 points)

PART 2 – The Applications – Show your calculations to earn full credit.

3. Mr. Smith is a city planner, who is designing a new park in Maadi. The plan of his rectangular park is shown on the grid included. The four “corners” of the park are:

- i. $A(4,10)$,
- ii. $B(16,2)$,
- iii. $C(4,-16)$ and
- iv. $D(-8,-8)$



For this park, determine:

- a. The length and width of the park, in meters, given that 1 unit on the grid represents a distance of 15 meters.

(3 points)

- b. The perimeter of the park.

(2 points)

- c. The total area of the park.

(2 points)

Mr. Smith now plans on including 3 walking paths within the park. These walking paths will connect the midpoints of the sides AD, AB, & BC

- d. Determine the coordinates of the midpoints and label them E, F, & G on the diagram. **(3 points)**

- e. Draw the three paths on the diagram and determine the total length of the paths within the park.

(3 points)

- f. Calculate the triangular area WITHIN the three paths.

(2 points)

Mr. Smith plans on planting trees on one side of the park. He would like to arrange these in a semicircle pattern on side DC.

- g. Sketch the semicircular pattern on the diagram.
- h. If trees are to be placed at intervals of 3 meters (i.e. all trees are planted 3 meters apart), how many trees does Mr. Smith need? **(3 points)**

PART 3 – Problem Solving – Show your thinking & reasoning to earn full credit.

4. Mr Santowski is the city engineer who is overseeing the construction of Mr. Smith's park. Mr. S. needs to know two important details in order to get the construction started. He needs to know the:

- a. Equation of the circle that the trees are planted on (see question 3g&h). **(2 points)**
- b. The total area of the semi-circular region that the trees surround. **(2 points)**