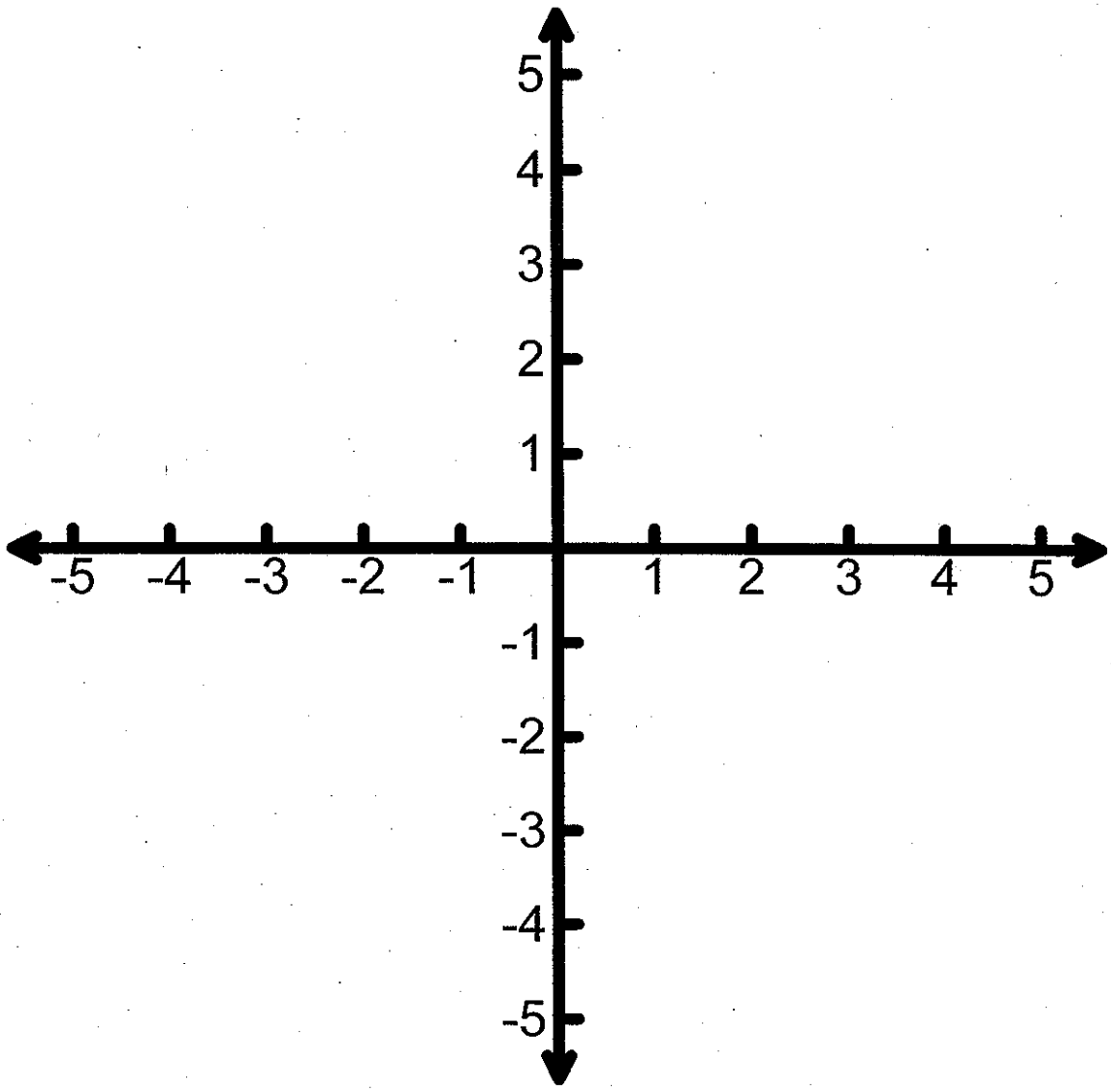
Warm Up - *Do with a partner!*

- Find dy/dx:
  - 1. $x^2 + y^2 = 4$
  - 2. $x^2 + y^2 = 9$
  - 3. $x^2 + y^2 = 25$
- On the given transparency, at each grey vertical grid line draw a small tangent line (about 1/8 to 1/4 inch long) to each circle.

Continued

- Remove the transparency from the background sheet.
- The graph on the transparency is called a **slope field**. It's a way to visualize a first-order differential equation. In this case, your transparency shows the slope field for

$$\frac{dy}{dx} = -\frac{x}{y}$$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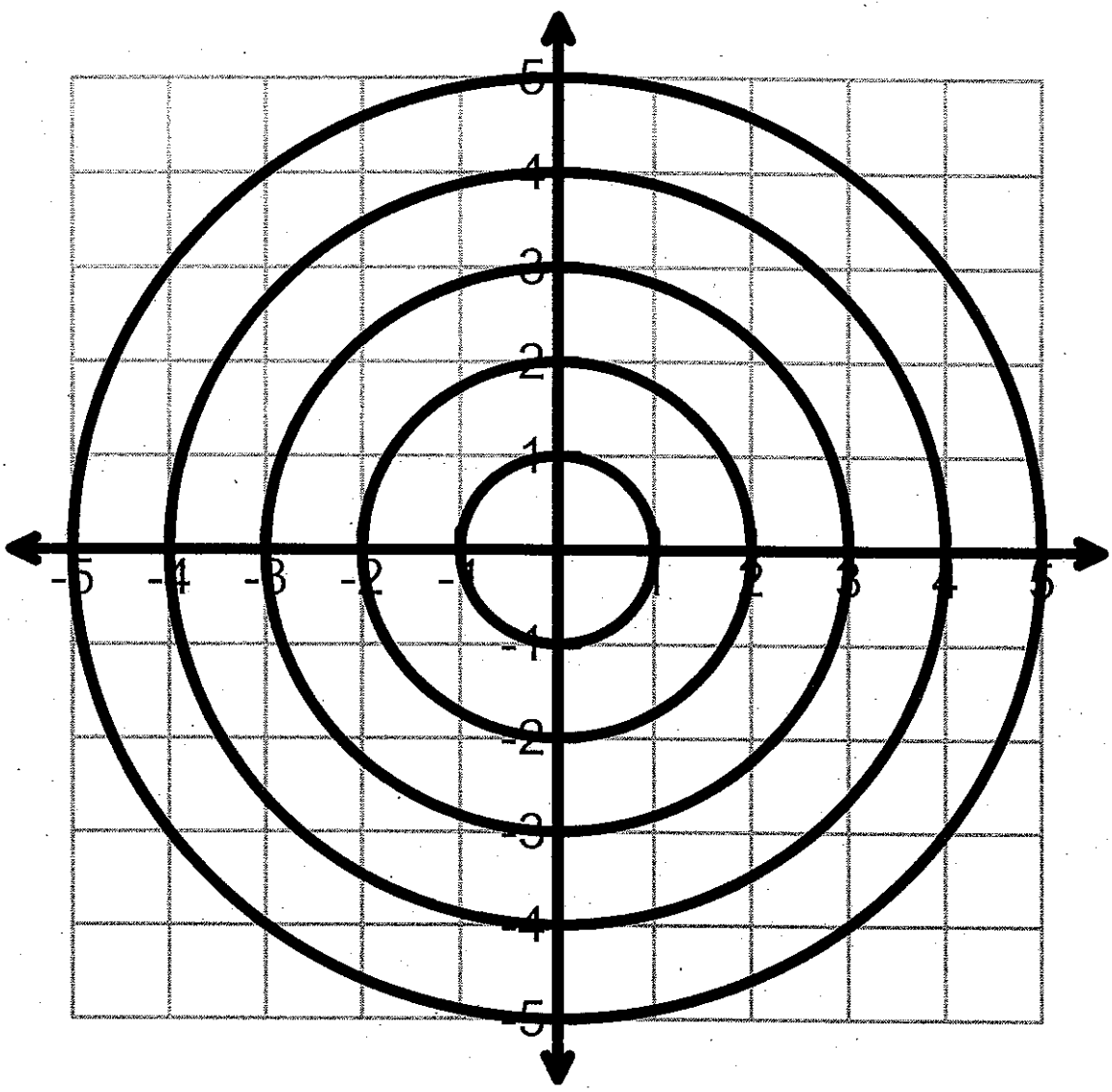
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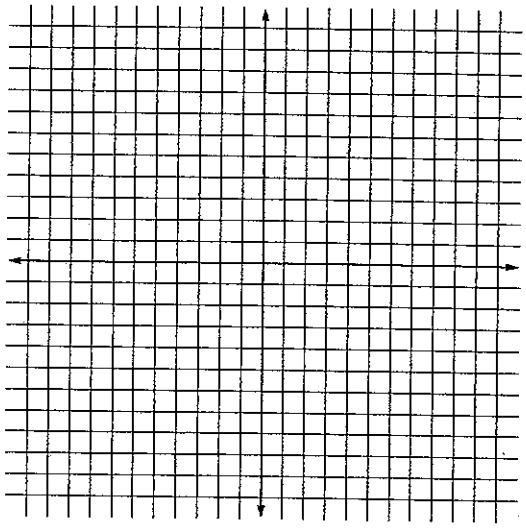
Sketching "Area Functions"

Name _____

1. Find $F(x) = \int(2x-2)dx$

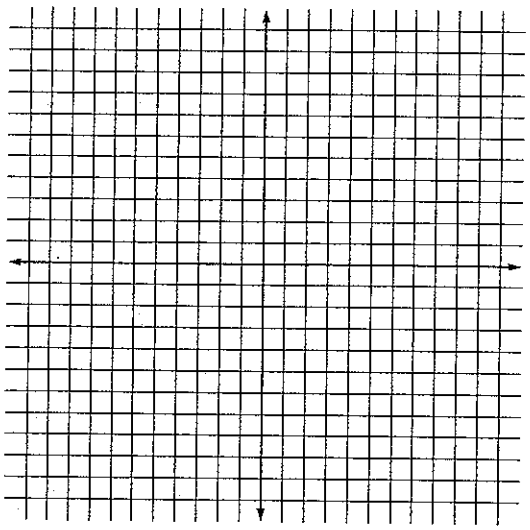
_____

2. Let $f(t) = 2t - 2$ on the interval [-2,4]. Sketch graph of f on the given interval.



3. Using your graph of f, sketch the graph of $A(x) = \int_0^x (2t-2)dt$ on the interval. (The y-value of a point (x,y) on function A represents area in the graph of f from $t = 0$ to $t = x$.)

x	-2	-1	0	1	2	3	4
A							

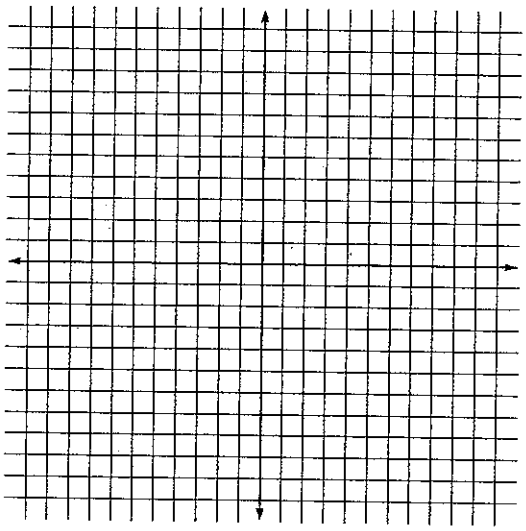


$y = A(x) =$ _____

Use the Fundamental Theorem of Calculus to derive the actual function for A.

4. Using your graph of f, sketch the graph of $A(x) = \int_1^x (2t-2)dt$ on the interval. (The y-value of a point (x,y) on function A represents area in the graph of f from $t = 1$ to $t = x$.)

x	-2	-1	0	1	2	3	4
A							

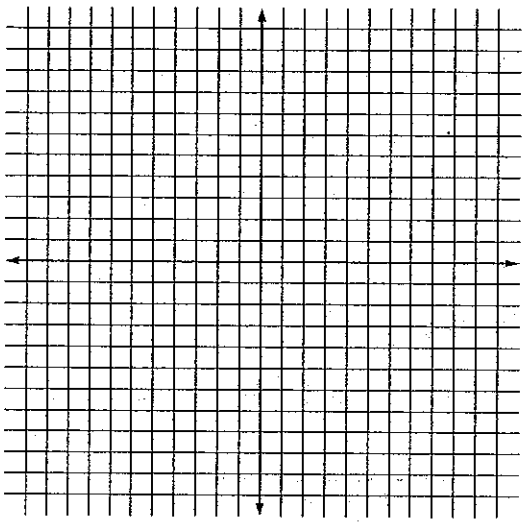


$y = A(x) =$ _____

Use the Fundamental Theorem of Calculus to derive the actual function for A.

5. Using your graph of f, sketch the graph of $A(x) = \int_{2}^{x} (2t-2)dt$ on the interval.

x	-2	-1	0	1	2	3	4
A							

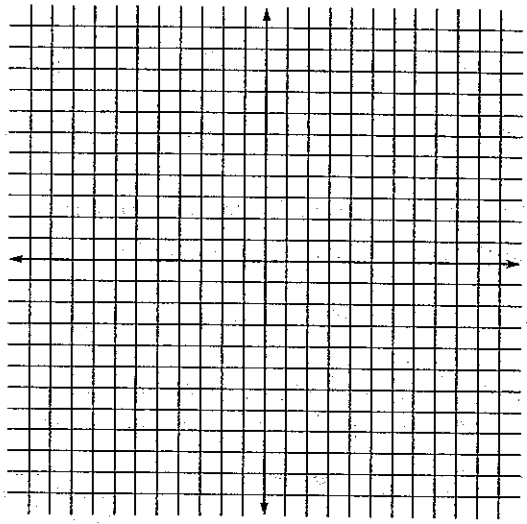


$y = A(x) =$ _____

Use the Fundamental Theorem of Calculus to derive the actual function for A.

6. Using your graph of f, sketch the graph of $A(x) = \int_{-1}^{x} (2t-2)dt$ on the interval.

x	-2	-1	0	1	2	3	4
A							



$y = A(x) =$ _____

Use the Fundamental Theorem of Calculus to derive the actual function for A.

7. How are the graphs similar?

$\int_{a}^{x} f(t)dt =$ _____

$F(x) =$ _____