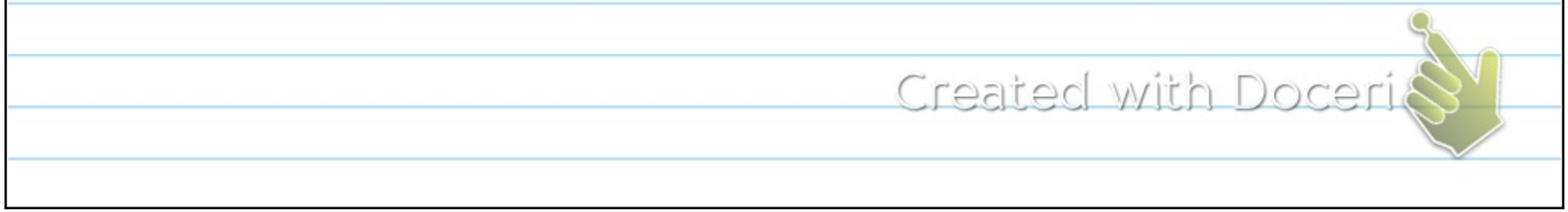
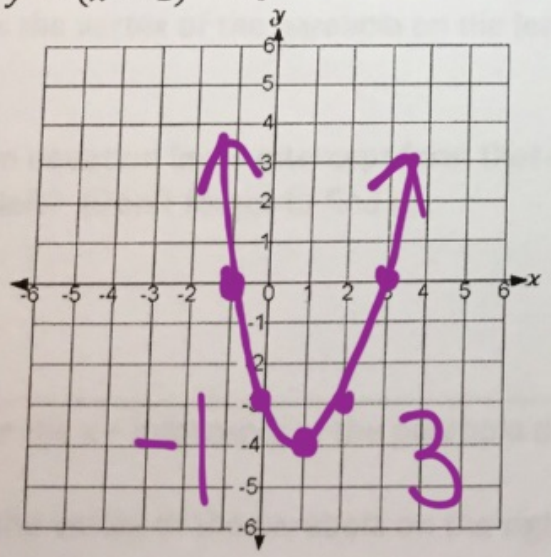
Unit 2
Lesson 4

X-intercept Form



➢ Review: Graph the following quadratic function and find the following information.

Graph: $y = (x-1)^2 - 4$



1. Vertex: (1, -4)
2. Maximum or Minimum
3. Axis of Symmetry: $x = 1$
4. y – intercept: (0, -3)
5. x – intercepts: (-1, 0) (3, 0)
6. Domain: $\mathbb{R}$
7. Range: $[-4, \infty)$

I. Writing quadratic equations using x – intercept form: $y = a(x - int.)(x - int.)$

A) Let's use the above information to help write the same equation in x – intercept form

✓ Step 1: $y = a(x - \underline{(-1)})(x - \underline{(3)})$ $y=a(x+1)(x-3)$ V: (1, -4)

✓ Step 2: Now we need to find a. We can do this by substituting in any other ordered pair that lies on the parabola. (For example try using either the vertex or the y – intercept)

$y=a(x+1)(x-3)$ $v(1,-4)$ $a=1$

✓ Step 3: Now write the final equation using the a and the intercepts together: $y =$ $1(x+1)(x-3)$

➢ Think back to MATH 1 and let's prove why $y = (x-1)^2 - 4$ and $y =$ $1(x+1)(x-3)$ are the same equations, just in different forms.

2 Slides over

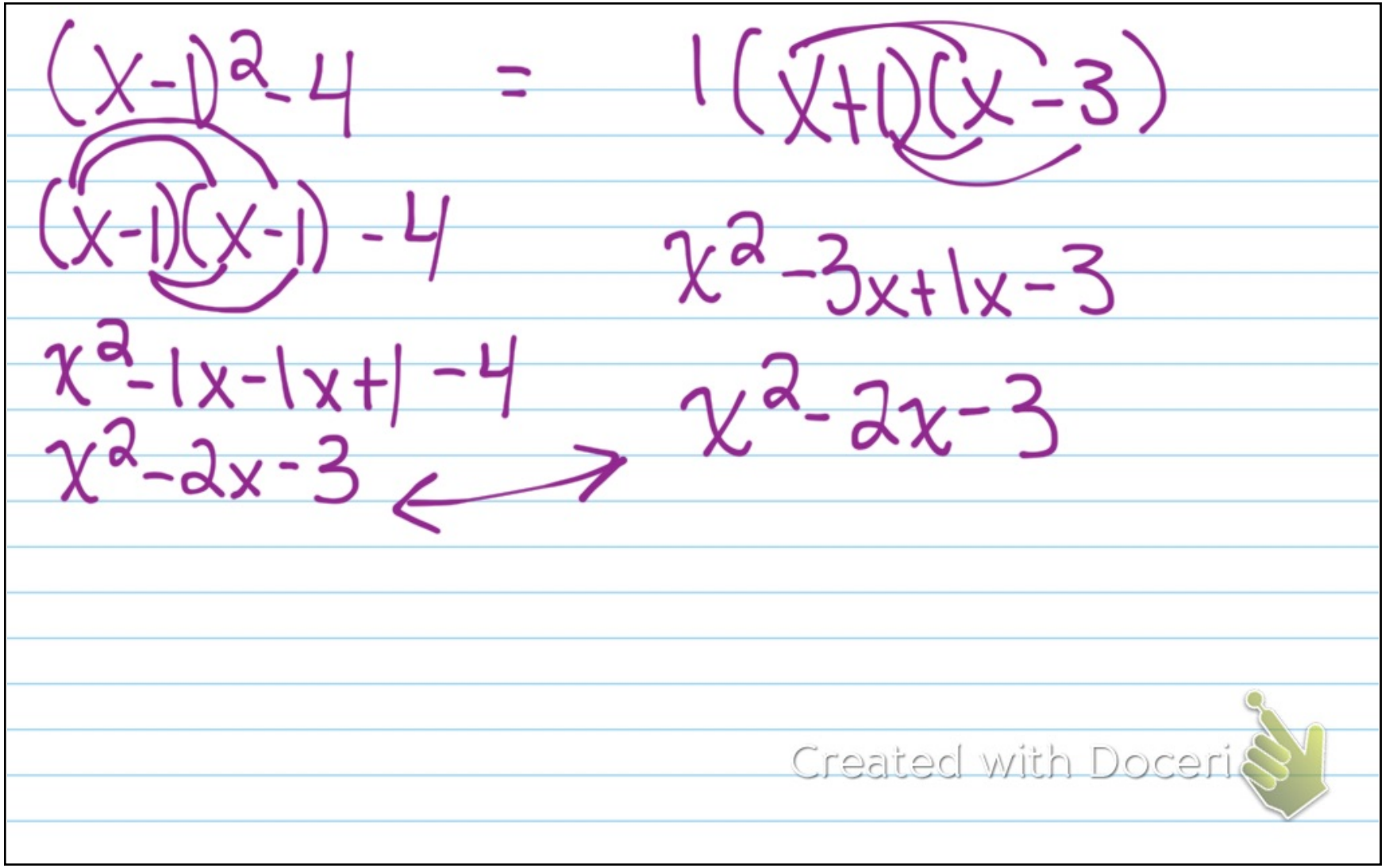
Step 2: $(1, -4)$
x, y

$y = a(x+1)(x-3)$

$-4 = a(1+1)(1-3)$

$-4 = a(2)(-2)$

$\frac{-4}{-4} = \frac{-4a}{-4}$ $\quad a = 1$


(x-1)²-4 = 1(x+1)(x-3)
(x-1)(x-1)-4
x²-3x+1x-3
x²-1x-1x+1-4
x²-2x-3
x²-2x-3
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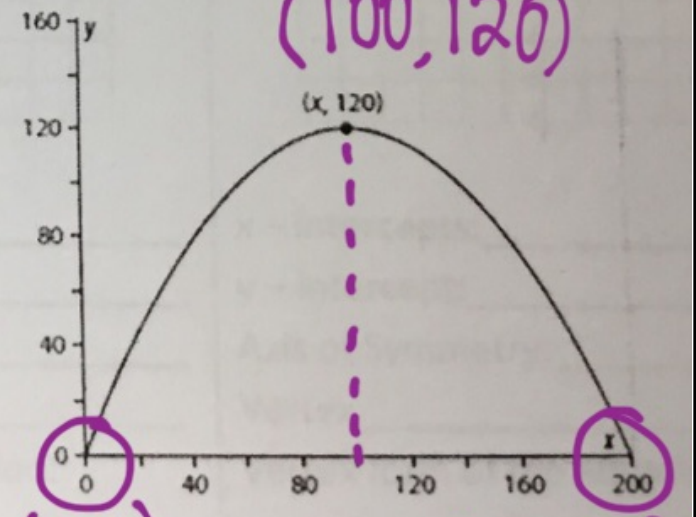
B) Given the following graph, write a quadratic function in $x-$ *intercept form* that describes the graph.

Remember: $\boxed{y = a(x - int.)(x - int.)}$



$y = a(x-0)(x-200)$

$120 = a(100-0)(100-200)$

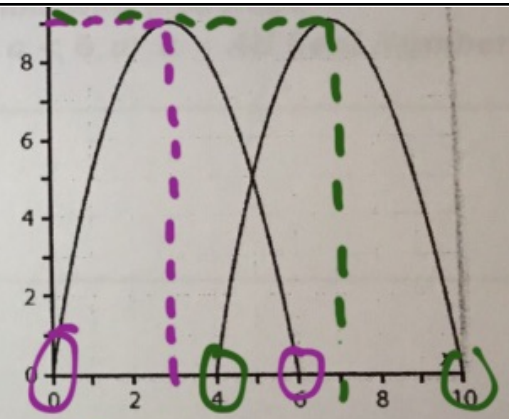
$120 = a(100)(-100)$

$\frac{120}{-10000} = \frac{-10000a}{-10000}$

$-.012 = a$

$f(x) = -.012(x-0)(x-200)$

c) The logo chosen for Magic Moments uses a parabola theme with a large letter M drawn using two intersecting parabolas. The idea of the logo is shown on the graph.



1. What are the x – intercepts of the parabola on the left?

(0,0)(6,0)

2. What is the vertex of the parabola on the left?

(3,9)

3. Write an equation in x – intercept form that describes the parabola on the left? (Don't forget to find a).

$y=a(x-0)(x-6)$

$x=3 \quad y=9$

$9=a(3-0)(3-6)$

$9=a(3)(-3)$

$\frac{9}{-9}=\frac{-9a}{-9}$

$-1=a$

$f(x)=-1(x-0)(x-6)$

4. What are the x – intercepts of the parabola on the right?

(4,0)(10,0)

5. What is the vertex of the parabola on the right?

(7,9)

6. Write an equation in x – intercept form that describes the parabola on the right? (Don't forget to find a).

$9=a(7-4)(7-10)$

$9=(3)(-3)a$

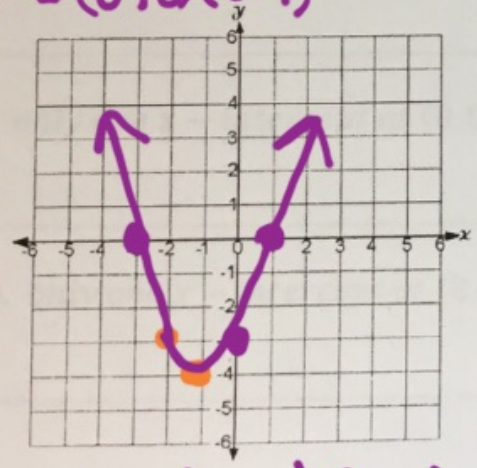
$9=-9a$

$a=-1$

$f(x)=-1(x-4)(x-10)$

1. $y = (x+3)(x-1)$

$y = (0+3)(0-1)$



x – intercepts: (-3,0)(1,0)

y – intercept: (0,-3)

Axis of Symmetry: x = -1

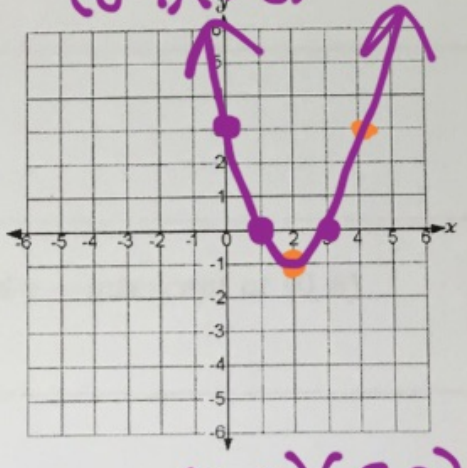
Vertex (-1,-4)

Vertex form of the equation:

$y = (x+1)^2 - 4$

2. $y = (x-1)(x-3)$

$(0-1)(0-3)$



x – intercepts: (1,0)(3,0)

y – intercept: (0,3)

Axis of Symmetry: x = 2

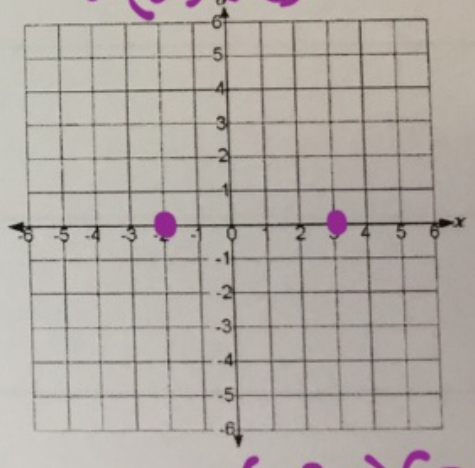
Vertex (2,-1)

Vertex form of the equation:

$y = (x-2)^2 - 1$

3. $y = -2(x+2)(x-3)$

$-2(2)(-3)$



x – intercepts: (-2,0)(3,0)

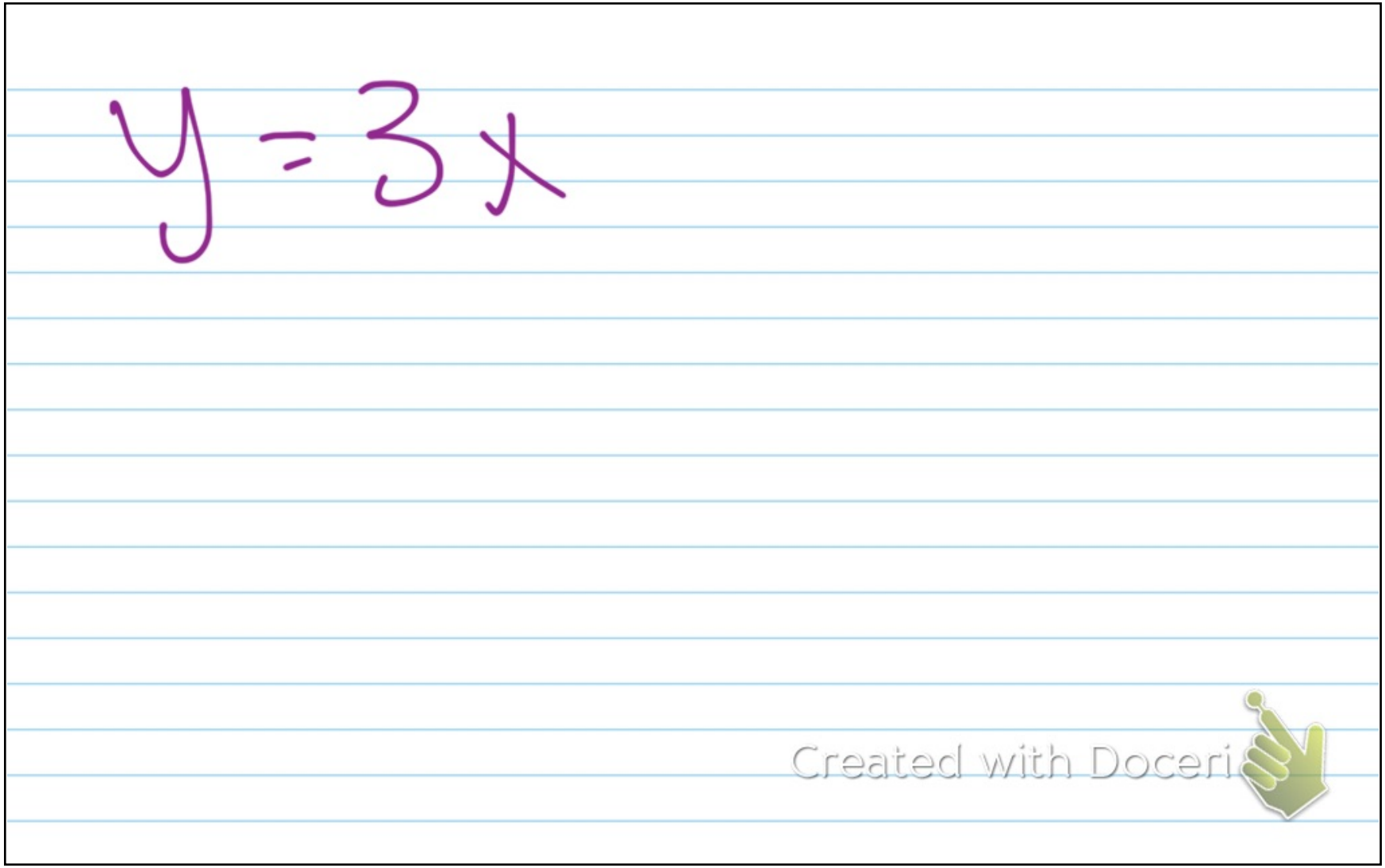
y – intercept: (0,12)

Axis of Symmetry: x = .5

Vertex (.5, 12.5)

Vertex form of the equation:

$y = -2(x-.5)^2 + 12.5$


y = 3x
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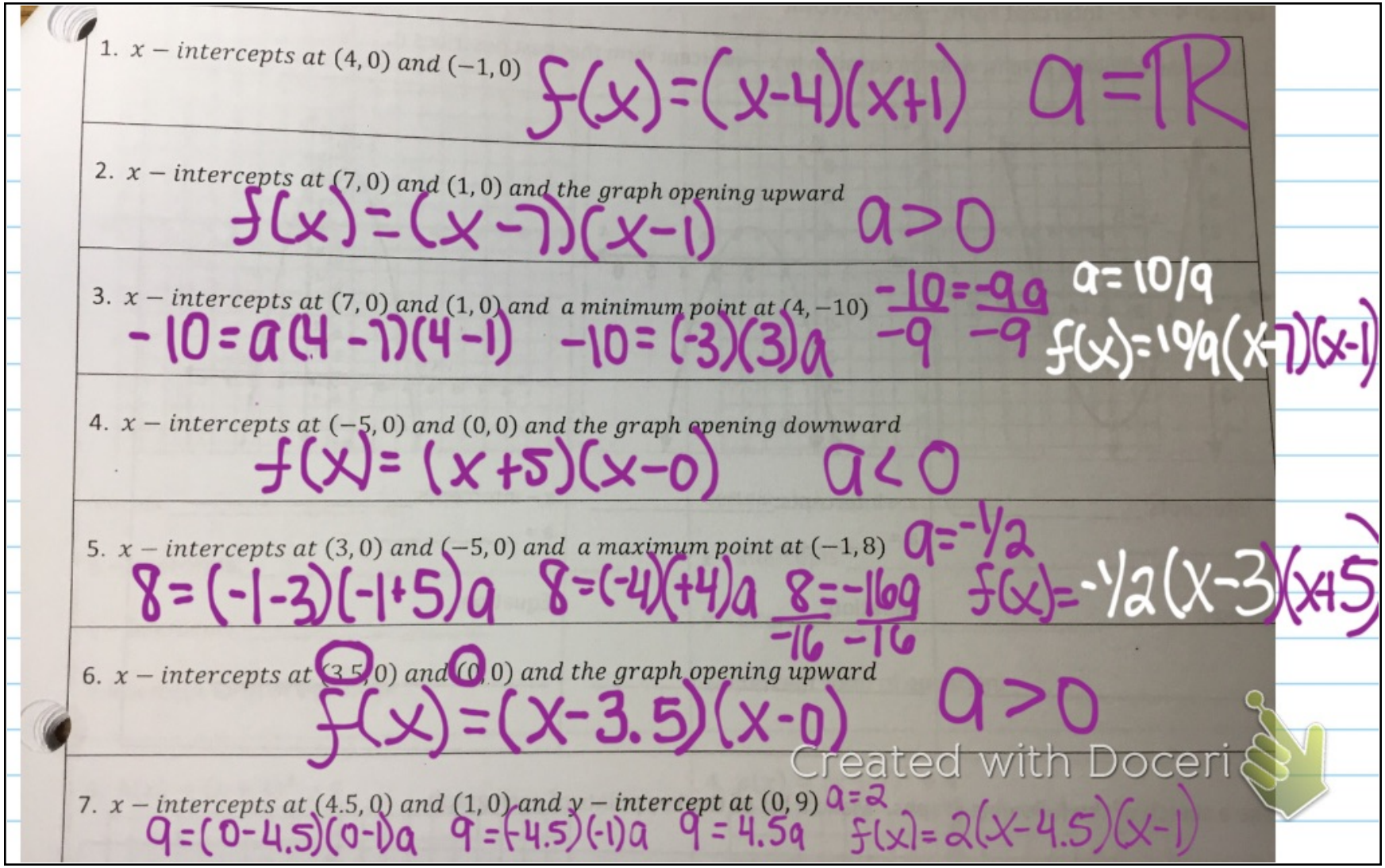
1. $x-$ intercepts at $(4,0)$ and $(-1,0)$
f(x)=(x-4)(x+1) a=1R
2. $x-$ intercepts at $(7,0)$ and $(1,0)$ and the graph opening upward
f(x)=(x-7)(x-1) a>0
3. $x-$ intercepts at $(7,0)$ and $(1,0)$ and a minimum point at $(4,-10)$
-10=a(4-7)(4-1) -10=(-3)(3)a -10/-9=-9a/-9 a=10/9
f(x)=10/9(x-7)(x-1)
4. $x-$ intercepts at $(-5,0)$ and $(0,0)$ and the graph opening downward
f(x)=(x+5)(x-0) a<0
5. $x-$ intercepts at $(3,0)$ and $(-5,0)$ and a maximum point at $(-1,8)$
8=(-1-3)(-1+5)a 8=(-4)(+4)a 8/-16=-16a/-16 a=-1/2
f(x)=-1/2(x-3)(x+5)
6. $x-$ intercepts at $(3.5,0)$ and $(0,0)$ and the graph opening upward
f(x)=(x-3.5)(x-0) a>0
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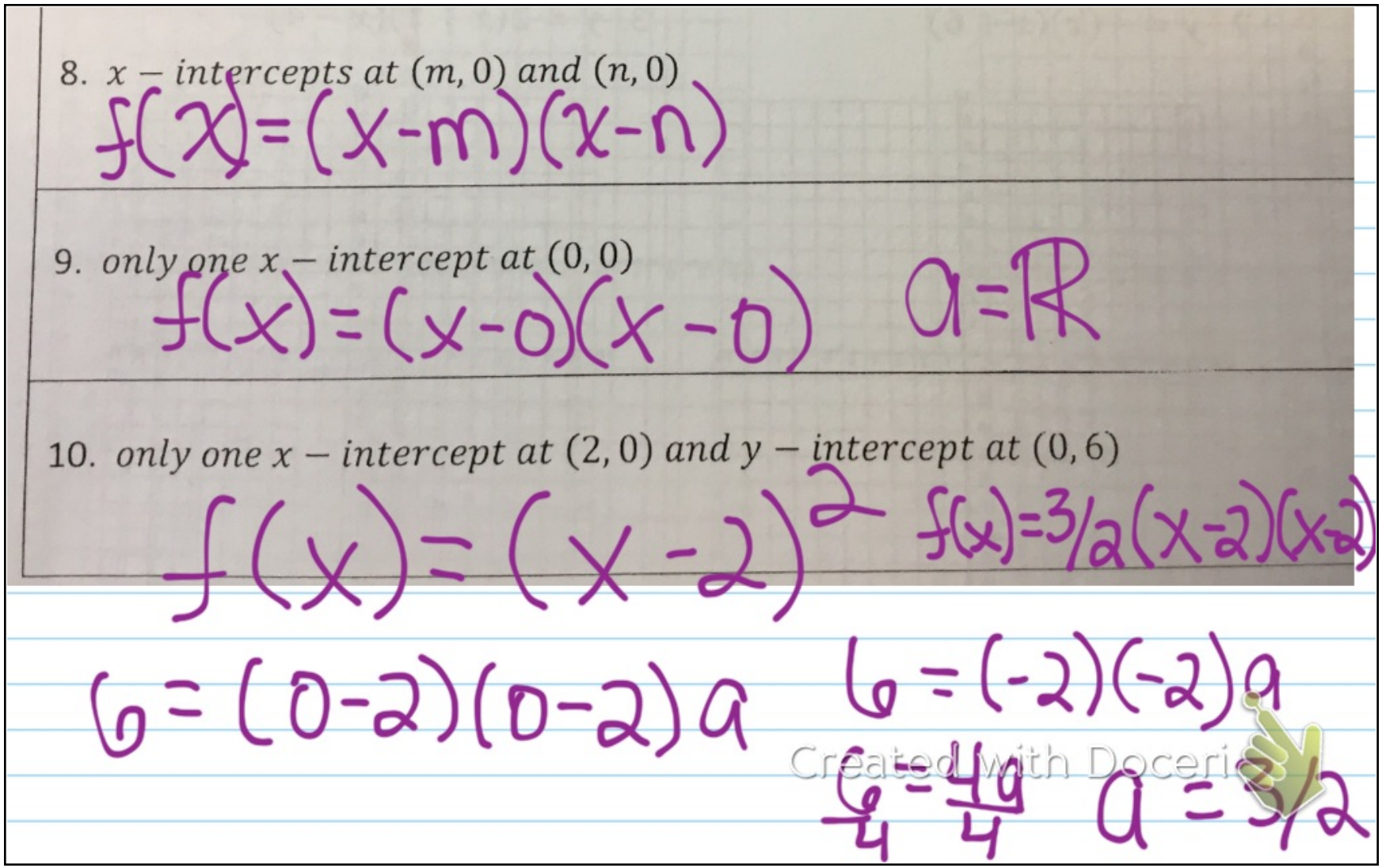
7. $x-$ intercepts at $(4.5,0)$ and $(1,0)$ and $y-$ intercept at $(0,9)$
9=(0-4.5)(0-1)a 9=(-4.5)(-1)a 9=4.5a a=2
f(x)=2(x-4.5)(x-1)


8. $x-$ intercepts at $(m,0)$ and $(n,0)$
$f(x)=(x-m)(x-n)$
9. only one $x-$ intercept at $(0,0)$
$f(x)=(x-0)(x-0)$ $a=\mathbb{R}$
10. only one $x-$ intercept at $(2,0)$ and $y-$ intercept at $(0,6)$
$f(x)=(x-2)^2$ $f(x)=3/2(x-2)(x-2)$
$6=(0-2)(0-2)a$ $6=(-2)(-2)a$
$\frac{6}{4}=\frac{4a}{4}$ $a=3/2$
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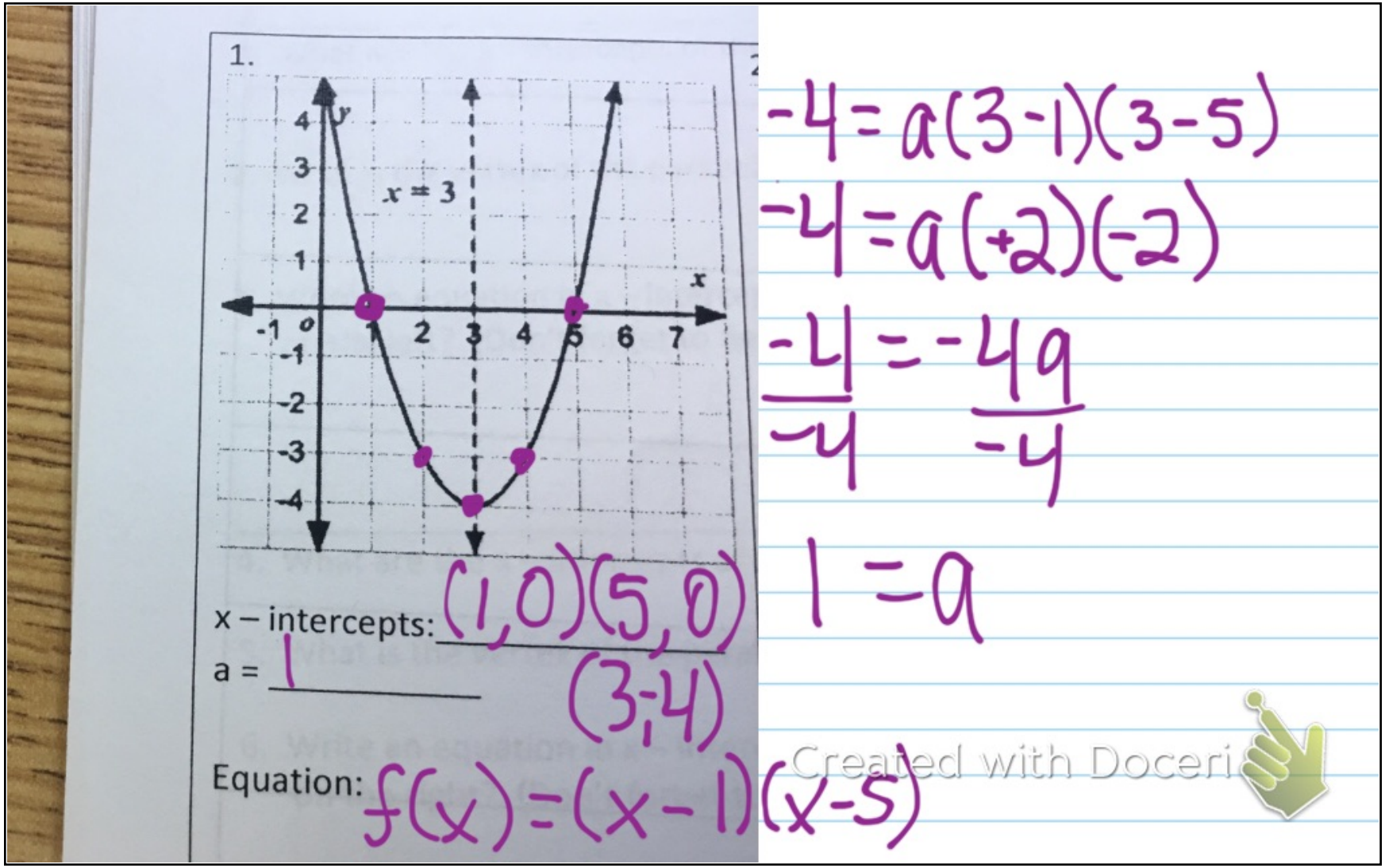
1.
x = 3
x – intercepts: (1,0)(5,0)
a = 1
(3,-4)
Equation: f(x) = (x-1)(x-5)
-4 = a(3-1)(3-5)
-4 = a(+2)(-2)
-4/-4 = -4a/-4
1 = a
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