

# PRACTICE factored Standard Forms

August 26, 2016 5:20 PM

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## PRACTICE Factored & Standard Forms

1. **Expanding** Complete the chart below by changing from factored form to standard form. (FOIL)

Factored form $y = (x - s)(x - t)$	x-intercepts	Standard Form $y = ax^2 + bx + c$	y-intercept
a) $y = (x + 2)(x + 6)$			
b)	$x = 5$ and $x = -6$		-60
c)	$x = -2$ and $x = -1$		-4

2. **Factoring** Write factored expressions and determine the x- and y-intercepts for each.

	Standard form	Factored form	x-intercepts	y-intercept
a)	$y = 8x^2 + 10x$			
b)	$y = x^2 + 5x + 6$			

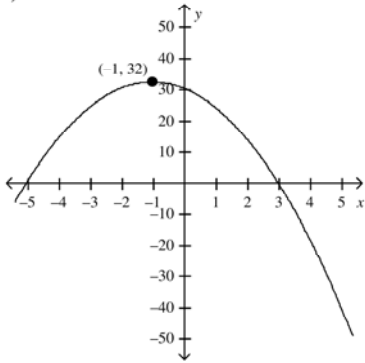
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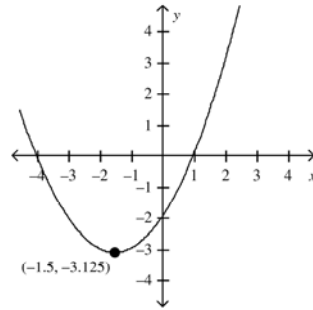
3. For each of the following graphs answer these questions.

- What is the maximum/minimum?
- When did the maximum/minimum occur?
- What are the zeros?
- Find an equation to describe the graph. (Use factored and vertex form.)

i)



ii)



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4. For each of the following quadratic relations state the following:

- a) the direction of opening
- b) the zeros
- c) the equation of the axis of symmetry
- d) the maximum or minimum value of  $y$
- e) the coordinates of the vertex
- f) sketch using vertex and zeros

i)  $y = -2(x - 4)(2x + 5)$

ii)  $y = (10 + 2x)(-2x - 4)$

iii)  $y = -(6 - 3x)(4 - 2x)$

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5. For the following equations answer the following:
- State the transformations of this parabola
  - Sketch the relation (use vertex and step pattern, or table of values)
  - Find the maximum or minimum.
  - When did the parabola reach the maximum/minimum?

$$y = -0.1(x - 8)^2 - 3$$

6. Evaluate. Express your answer in rational form. Explain how you found your answer.

a)  $(-3)^{-4}$

b)  $9.78^0$

c)  $-(-6)^{-3}$

d)  $7^{-3} \div \left(\frac{7^2}{7^{-1}}\right)^{-2}$

e)  $-9^{-2} + \left(\frac{9^1}{6^2}\right)^{-1}$

f)  $\frac{4^3}{16^0} \times \left(5^2 \times 5^{-3}\right)^{-2}$

7. Without evaluating, write the given numbers in order from least to greatest.

$$6^{-5}, 2^{-1}, (-8)^3, (0.001)^{-2}, (-10)^4$$

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**PRACTICE Factored & Standard Forms**

1. **Expanding** Complete the chart below by changing from factored form to standard form. (FOIL)

Factored form $y = (x - s)(x - t)$	x-intercepts	Standard Form $y = ax^2 + bx + c$	y-intercept
a) $y = (x + 2)(x + 6)$	$x = -2$ and $x = -6$	$y = x^2 + 2x + 6x + 12$ $y = x^2 + 8x + 12$	$(0, 12)$
b) $y = a(x - 5)(x + 6)$ $-60 = a(-5)(6)$ $-60 = -30a$ $2 = a$ $\therefore y = 2(x - 5)(x + 6)$	$x = 5$ and $x = -6$	$y = 2(x^2 + 6x - 5x - 30)$ $y = 2x^2 + 2x - 60$	$-60$ sub $(0, -60)$
c) $y = a(x + 2)(x + 1)$ $-4 = a(2)(1)$ $-2 = a$ $\therefore y = -2(x + 2)(x + 1)$	$x = -2$ and $x = -1$	$y = -2(x^2 + 2x + 1x + 2)$ $y = -2x^2 - 6x - 4$	$-4$ sub $(0, -4)$

2. **Factoring** Write factored expressions and determine the x- and y-intercepts for each.

	Standard form	Factored form	x-intercepts	y-intercept
a)	$y = 8x^2 + 10x$	$y = 2x(4x + 5)$	$x = 0$ and $x = -\frac{5}{4}$	$(0, 0)$
b)	$y = x^2 + 5x + 6$	$y = (x + 2)(x + 3)$	$x = -2$ and $x = -3$	$(0, 6)$

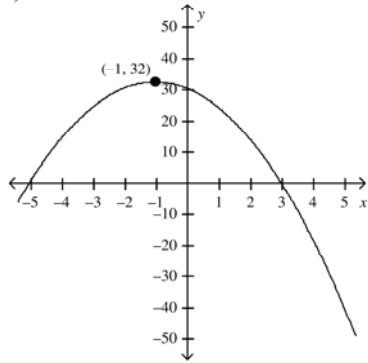
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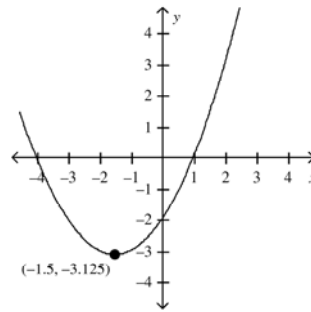
3. For each of the following graphs answer these questions.

- What is the maximum/minimum?
- When did the maximum/minimum occur?
- What are the zeros?
- Find an equation to describe the graph. (Use factored and vertex form.)

i)



ii)



a) MAX  $y = 32$

b) at  $x = -1$

c)  $x = -5$  and  $x = 3$

d) factored:

$$y = a(x+5)(x-3)$$

sub pt.  $(-1, 32)$

$$32 = a(-1+5)(-1-3)$$

$$32 = a(4)(-4)$$

$$32 = -16a$$

$$-2 = a$$

$$\therefore y = -2(x+5)(x-3)$$

vertex

$$y = -2(x+1)^2 + 32$$

a) MIN  $y = -3.125$

b) at  $x = -1.5$

c)  $x = -4$  and  $x = 1$

d) vertex

$$y = a(x+1.5)^2 - 3.125$$

sub pt.  $(1, 0)$

$$0 = a(1+1.5)^2 - 3.125$$

$$3.125 = a(2.5)^2$$

$$3.125 = 6.25a$$

$$0.5 = a$$

$$\therefore y = 0.5(x+1.5)^2 - 3.125$$

factored

$$y = 0.5(x-1)(x+4) \quad 2$$

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- c) the equation of the axis of symmetry
- d) the maximum or minimum value of  $y$
- e) the coordinates of the vertex
- f) sketch using vertex and zeros

i)  $y = -2(x-4)(2x+5)$

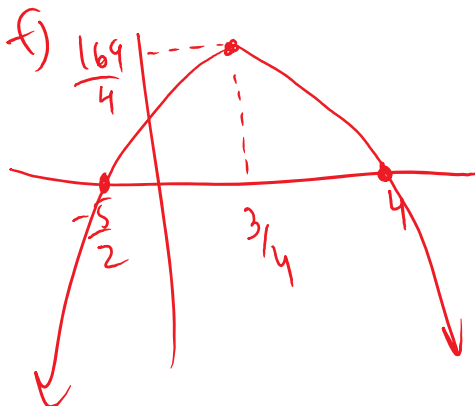
a)  $y = (-2x+8)(2x+5)$   
 $y = -4x^2 + 6x + 40$   
 $\therefore$  direction is down  
 $\therefore$  MAX

b)  $x = 4$  and  $x = -\frac{5}{2}$

c) a.o.s  $x = \frac{4 + (-\frac{5}{2})}{2}$   
 $x = \frac{3}{4}$

d) opt. val  
 $y = -2(\frac{3}{4}-4)(2(\frac{3}{4})+5)$   
 $y = -2(-\frac{13}{4})(\frac{13}{2})$   
 $y = \frac{169}{4}$  MAX

e) vertex  $(\frac{3}{4}, \frac{169}{4})$



ii)  $y = (10+2x)(-2x-4)$

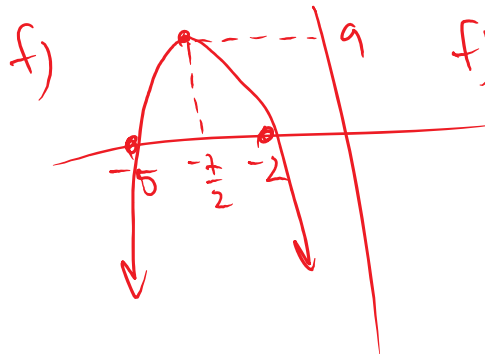
a)  $y = -20x - 40 - 4x^2 - 8x$   
 $y = -4x^2 - 28x - 40$   
 $\therefore$  direction is down

b)  $x = -5$  and  $x = -2$

c) a.o.s  $x = \frac{-5 + (-2)}{2}$   
 $x = -\frac{7}{2}$

d)  $y = (10 + 2(-\frac{7}{2}))(-2(-\frac{7}{2}) - 4)$   
 $y = (3)(3)$   
 $y = 9$  MAX

e) vertex  $(-\frac{7}{2}, 9)$



iii)  $y = -(6-3x)(4-2x)$

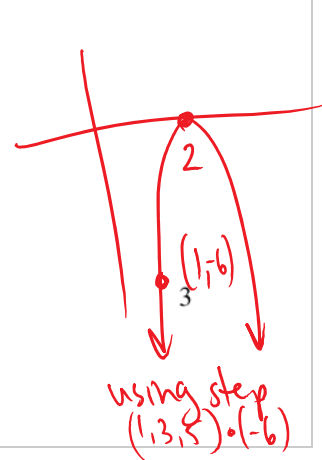
a)  $y = (-6+3x)(4-2x)$   
 $y = -24 + 12x + 12x - 6x^2$   
 $y = -6x^2 + 24x - 24$   
 $\therefore$  direction is down

b)  $x = 2$  only

c) a.o.s  $x = 2$

d)  $y = -1(6-3(2))(4-2(2))$   
 $y = -1(0)(0)$   
 $y = 0$  MAX

e) vertex  $(2, 0)$



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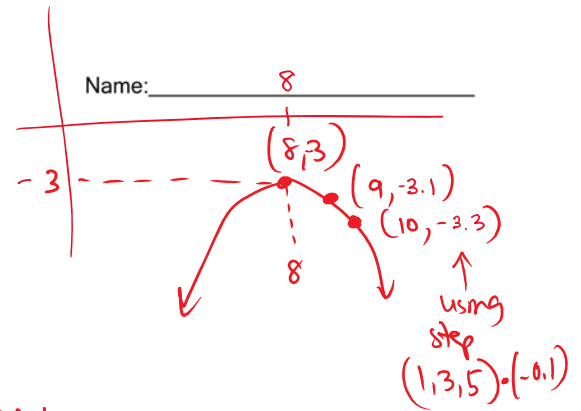
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5. For the following equations answer the following:
- State the transformations of this parabola
  - Sketch the relation (use vertex and step pattern, or table of values)
  - Find the maximum or minimum.
  - When did the parabola reach the maximum/minimum?

$y = -0.1(x-8)^2 - 3$

a)  $a = -0.1$  → reflect in x-axis  
 vertical compression  
 $h = 8$  → shift right  
 $k = -3$  → shift down

b)  $\text{MAX } y = 3$   
 d) at  $x = 8$



6. Evaluate. Express your answer in rational form. Explain how you found your answer.

a)  $(-3)^{-4} = \frac{1}{(-3)^4} = \frac{1}{81}$

b)  $9.78^0 = 1$

c)  $-(-6)^{-3} = \frac{-1}{(-6)^3} = \frac{-1}{-216} = \frac{1}{216}$

d)  $7^{-3} \div \left(\frac{7^2}{7^{-1}}\right)^{-2}$   
 =  $7^{-3} \div (7^3)^{-2}$  (subt.)  
 =  $7^{-3} \div (7^{-6})$  (mult)  
 =  $7^{-3-(-6)}$   
 =  $7^3 = 343$

e)  $-9^{-2} + \left(\frac{9^1}{6^2}\right)^{-1}$   
 =  $-\frac{1}{9^2} + \left(\frac{9}{36}\right)^{-1}$   
 =  $-\frac{1}{81} + \left(\frac{1}{4}\right)^{-1}$   
 =  $-\frac{1}{81} + \frac{4 \cdot 81}{1 \cdot 81} = \frac{323}{81}$

f)  $\frac{4^3}{16^0} \times (5^2 \times 5^{-3})^{-2}$   
 =  $\frac{4^3}{1} \times (5^{-1})^{-2}$  (add)  
 =  $64 \times (5)^2$  (mult)  
 =  $64 \times 25$   
 =  $1600$

7. Without evaluating, write the given numbers in order from least to greatest.

$6^{-5}, 2^{-1}, (-8)^3, (0.001)^{-2}, (-10)^4$

$(-8)^3, 6^{-5}, 2^{-1}, (-10)^4, (0.001)^{-2}$

$-512, 0.0001286, 0.5, 10000, 1000000$