Pick up the Warm Up

skip #5

HW QUESTIONS

Tomorrow there will be a Quiz on Sequences & Exponential Functions

Later you will see your LCQ from last week.

1. Last week we learned to create an exponential function in the form $y=ab^x$ using the "Double Substitution Method". Use it now to find the exponential function that passes through the two points (2 , 12) and (5, 187.5)

(2, 12) $y = ab^x$ $12 = ab^2$

(5, 187.5) $y = ab^x$ $187.5 = ab^5$

$a = \frac{12}{b^2}$

$187.5 = \frac{12}{b^2} b^5$

$187.5 = 12 \cdot b^3$

$b^3 = \frac{187.5}{12}$

$\sqrt[3]{\quad}$ $\sqrt[3]{\quad}$

$b = 2.5$

$a = \frac{12}{(2.5)^2} = 1.92$

$y = 1.92(2.5)^x$

$12 = ab^2$

$\frac{1875}{12} = \frac{ab^3}{ab^2}$

$b^3 = \frac{187.5}{12}$

$2x = 10$

(2) Find the future value of an 8 year investment of \$4500 that pays an annual interest of 4.25%, compounded once once a year.

grow

$100\% + 4.25\%$

104.25%

$b = 1.04$

$y = 4500(1.04)^8$

$\approx \$6158.56$

Compound Interest Formula:

$$\textbf{\textit{Future Value}} = \text{PV}(1 + \frac{r}{k})^{kt}$$

where PV = Present Value

r = annual interest (as a decimal)

t = number of years \$ is being invested

k = # times per year interest is compounded

(3) Find the future value of ~~an 8 year investment~~ of \$4500 that pays an annual interest of 4.25%, compounded once TWICE a year.

$r = .04$

$$FV = 4500\left(1 + \frac{.04}{2}\right)^{2 \cdot 8}$$

$$Future\ Value = PV\ (1 + \frac{r}{k})^{kt}$$

(4)

$n^{5/4}$ ← power of 5, ← 4th root

$\sqrt[4]{n^5}$ $\quad (\sqrt[4]{n})^5$

$x^{\frac{n}{5}}$ $\quad \sqrt[5]{x^n}$ or $(\sqrt[5]{x})^n$

$\sqrt[4]{16^5}$ $\quad \sqrt[4]{16}^5$

$\sqrt[4]{17^3}$ $\quad 17^{\frac{3}{4}}$

$\sqrt[3]{x}^2$ $\quad x^{\frac{2}{3}}$

(5)

$40x^2 + 80x - 50$

remember that all common factors have to pulled out first in order to use the box method.

$10(\quad)$

$10(4x^2 + 8x - 5)$

$10(\quad)(\quad)$

(6) Solve

$(16)^n = 4^{5n+1}$

$(4^2)^n = 4^{5n+1}$

$4^{2n} = 4^{5n+1}$

$2n = 5n+1$

$-2n \quad -2n$

$0 = 3n+1$

$-1 \quad -1$

$3n$

$n = -\frac{1}{3}$

$(6^2)^3$

QUESTIONS ON HW

B-53

a) $2x + y = -7y$ Substitution!

$y = x + 10$

$2x + (x+10) = -7(x+10)$

$3x + 10 = -7x - 70$

$+7x \quad +7x$

$10x + 10 = -70$

$10x = -80$

$x = -8$

$y = -8 + 10$

$= 2$

solution $(-8, 2)$

b) $3x = -5y$ re-arrange

$6x - 7y = 17$

$3x + 5y = 0$

$6x - 7y = 17$

multiply 1st equation by -2

$-6x + -10y = 0$

$+ \quad 6x - 7y = 17$

$-17y = 17$

$y = -1$

$3x = -5(-1)$

$3x = 5$

$x = \frac{5}{3}$

Solution $\left(\frac{5}{3}, -1\right)$

B-73

a) $3 \cdot x^2 \cdot \frac{1}{x^{-1}} \cdot y^{-3} \cdot \frac{1}{y^2}$

$3 \cdot x^2 \cdot x \cdot \frac{1}{y^3} \cdot \frac{1}{y^2}$

$\frac{3x^3}{y^5}$

b) $\frac{m^2 p^1 \cdot q^{-1}}{4 m^{-2} p^1 q^3}$

$\Downarrow$

$\frac{m^2 \cdot m^2}{4 \cdot q^1 \cdot q^3}$

$= \frac{m^4}{4q^4}$

B-89

(7, 16) (2, -4)

Equation of a line

$y = mx + b$

$16 = 4(7) + b$

$16 = 28 + b$

$-28 \quad -28$

$b = -12$

slope

$m = \frac{y - y}{x - x}$

$= \frac{16 - -4}{7 - 2}$

$= \frac{20}{5}$

$= 4$

$y = 4x - 12$

y-intercept

(0, -12)

x-intercept:

set $y = 0$

$0 = 4x - 12$

$4x = 12$

$x = 3$

(3, 0)

B-94 Write Exponential functions

a) (1, 7.5) (3, 16.875)

$y = ab^x$ $y = ab^x$

$7.5 = ab^1$ $16.875 = ab^3$

Using method 1 from class → solve for a

$a = \frac{7.5}{b}$

$16.875 = \frac{7.5}{b} \cdot b^3$

$16.875 = 7.5b^2$

$b^2 = \frac{16.875}{7.5}$

$b = 1.5 \rightarrow a = \frac{7.5}{1.5} = 5$

$y = 5(1.5)^x$

(b) (-1, 1.25) (3, 0.032)

$y = ab^x$ $y = ab^x$

$1.25 = ab^{-1}$ $0.032 = ab^3$

Using method 2 from class → Divide 2nd equation by the first

$\frac{.032}{1.25} = \frac{ab^3}{ab^{-1}}$

$.0256 = b^3 \cdot b^1$

$b^4 = .0256$

$\sqrt[4]{\ } \quad \sqrt[4]{\ }$

$b = 0.4$

$ab^3 = .032$

$a(.4)^3 = .032$

$a = \frac{.032}{.4^3}$

$a = 0.5$

$y = 0.5(0.4)^x$

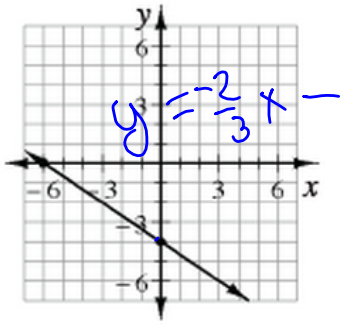
2-6 A negative coefficient ●● ····●·

$y = x^2$

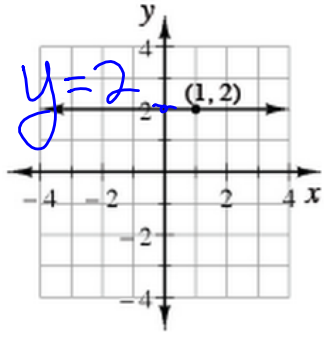
$y = -3x^2$

$y = -0.25x^2$

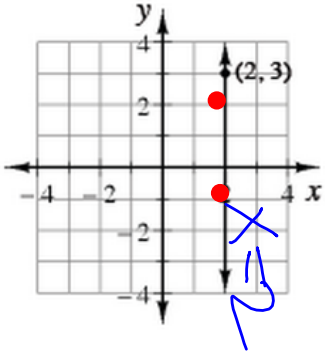
2-9

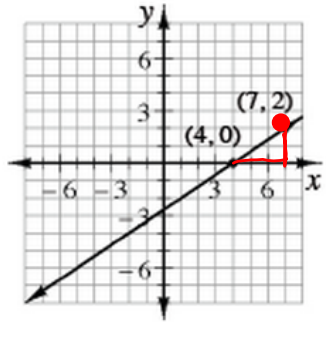
a. 

$y = -\frac{2}{3}x - 4$

b. 

$y = 2$

c. 

d. 

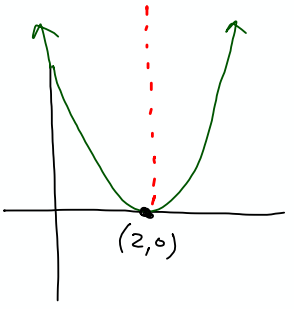
Aim How can I translate (shift) a parabola?

✓

Open your Textbook to page 60

2-11

We'll be making quality sketches rather than graphs

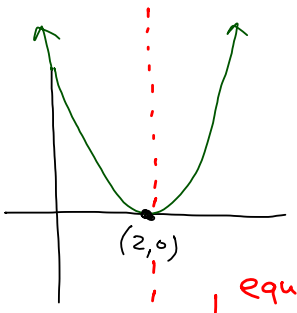


Notes

2-11 core problem

- ✓ I'll be circulating to answer questions
- ✓ I will assume you will have discussed w/ each other first.

- No repeats -

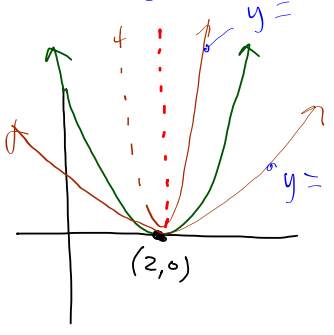


equation of line of symmetry is $x = 2$

(b) $y_1 =$ ← experiment in y_1

$y_2 = (x-2)(x-2)$

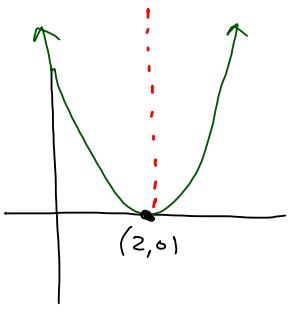
$y = 4(x-2)(x-2)$



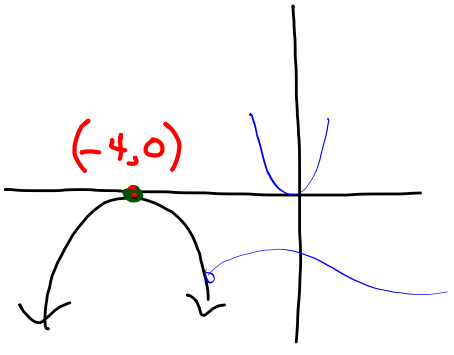
$y = x^2$

b)

c)



d)



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

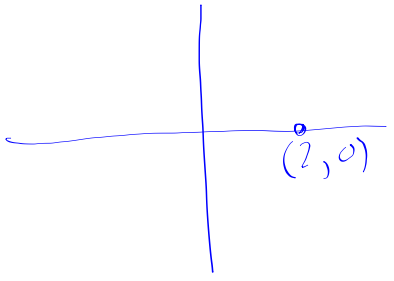
$-2(-x-4)^2$

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

$(x+4)(x-4)$

$(-x-4)(-x-4)$

Why does $y = (x-2)(x-2)$ only touch the x-axis at $x=2$?



Sharing of equations you have developed.

parabolas that touch the x-axis only at $x=2$

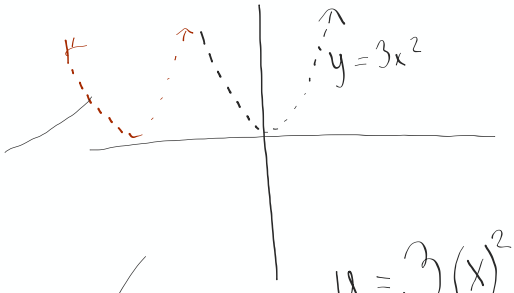
(and open downward)

How do you

Transform $y = 3x^2$

by translating it 5 units

to the left



$(3x-2)^2$

$y = 3(x+5)^2$ ✓

or $y = 3(x+5)(x+5)$ ✓

$y = 3(x)^2$

$3(x+5)^2$

The last assignment we will add to the yellow cover sheet will be this Wednesday's assignment. You will turn it in on Thursday.

Assignment

2- ... 16, 17, 18ab, 19-20, 21c