Chapter 6 Exam Review

Algebra 1B

1) Expand and simplify: $(-3x-2)^2$

$(-3x-2)(-3x-2)$

$9x^2+6x+6x+4$

$\boxed{9x^2+12x+4}$

2) Expand and simplify: $2(x+3)^2$

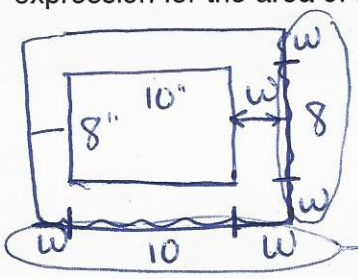
$2(x+3)(x+3)$

$2(x^2+3x+3x+9)$

$2(x^2+6x+9)$

$\boxed{2x^2+12x+18}$

3) An 8" by 10" photograph is being surrounded by a frame *w* inches wide. Write a simplified expression for the area of the picture and the frame.



$8+2w$

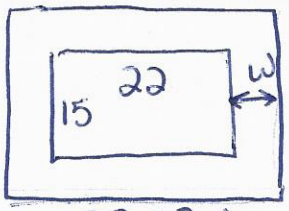
$10+2w$

$A=(8+2w)(10+2w)$

$A=80+16w+20w+4w^2$

$\boxed{A=80+36w+4w^2}$

4) A 22' by 15' pool is surrounded by a walkway *w* feet wide. Write a simplified expression for the area of the pool and the walkway.



$15+2w$

$22+2w$

$(22+2w)(15+2w)$

$330+44w+30w+4w^2$

$\boxed{330+74w+4w^2}$

5) Convert to standard form: $y+2=3(x-1)^2$

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

$y+2=3(x^2-1x-1x+1)$

$y+2=3(x^2-2x+1)$

$y+2=3x^2-6x+3$

$-2 \quad -2$

$\boxed{y=3x^2-6x+1}$

6) Convert to standard form: $y+1=-(x+3)^2$

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

$y+1=-(x^2+3x+3x+9)$

$y+1=-(x^2+6x+9)$

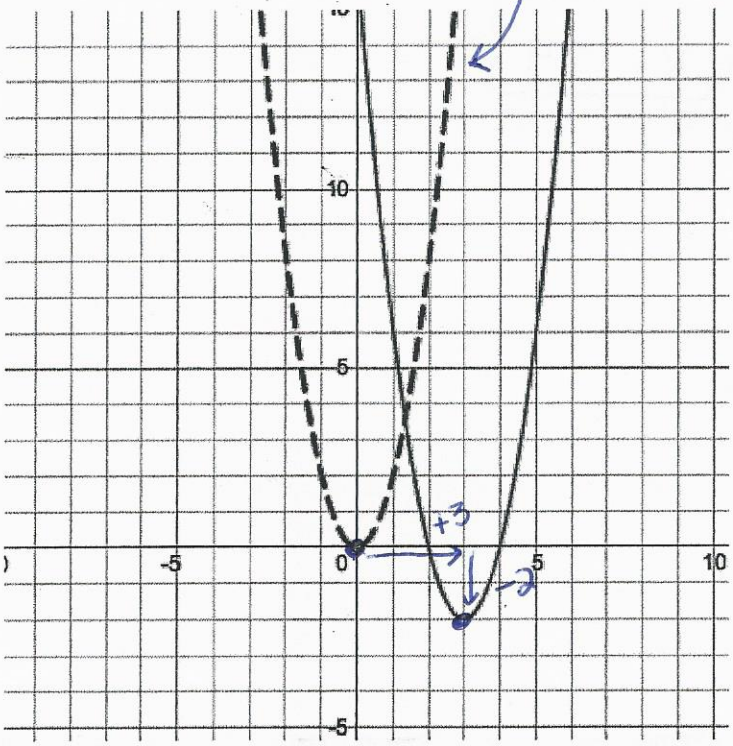
$y+1=-x^2-6x-9$

$-1 \quad -1$

$\boxed{y=-x^2-6x-10}$

7) The parabola below is a translation of $y = 2x^2$ (dotted line).

a



What translation maps the pre-image (dotted) to the image (solid)?

$T_{3,-2}$

h K

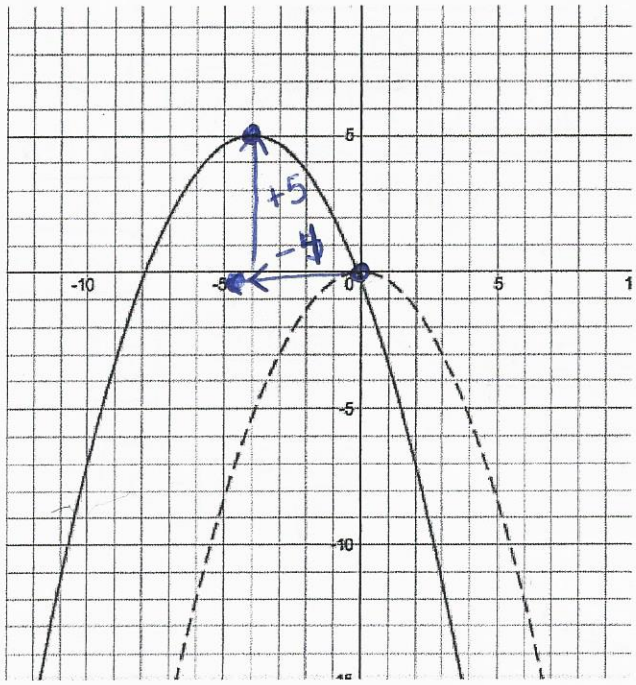
Write an equation for the image (solid line) in vertex form.

$y - k = a(x-h)^2$

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

8) The parabola below is a translation of $y = -\frac{1}{3}x^2$ (dotted line).

a



What translation maps the pre-image (dotted) to the image (solid)?

$T_{-4,5}$

h K

Write an equation for the image (solid line) in vertex form.

$y - k = a(x-h)^2$

$y - 5 = -1/3(x+4)^2$

$2x^2+1=5$ - Reg.

$2x^2+3x-4=7$ - Q.F.

9) Solve: $3x^2+5=53$

$-5 \quad -5$

$\frac{3x^2}{3}=\frac{48}{3}$

$\sqrt{x^2}=\sqrt{16}$

$x=4$ or $x=-4$ → $\boxed{x=\pm 4}$

10) Solve: $-3x^2+4=1$

$-4 \quad -4$

$\frac{-3x^2}{-3}=\frac{-3}{-3}$

$\sqrt{x^2}=\sqrt{1}$

$\boxed{x=\pm 1}$

11) Solve: $2x^2=-50$

$\frac{2x^2}{2}=\frac{-50}{2}$

$\sqrt{x^2}=\sqrt{-25}$

$\boxed{\varnothing}$

12) Solve: $(2x-5)^2+8=17$

$(2x-5)(2x-5)+8=17$

$4x^2-10x-10x+25+8=17$

$4x^2-20x+33=17$

$-17 \quad -17$

$4x^2-20x+16=0$ → QF

$a \quad b \quad c$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{20\pm\sqrt{(-20)^2-4\cdot4\cdot16}}{2\cdot4}$

$\frac{20\pm12}{8}$

$\frac{20+12}{8}$ $\quad$ $\frac{20-12}{8}$

$\boxed{x=4 \text{ or } x=1}$

13) Solve: $2x^2-2x-12=0$

$x=\frac{2\pm\sqrt{(-2)^2-4\cdot2\cdot-12}}{2\cdot2}=\frac{2\pm10}{4}$

$\frac{2+10}{4}=\boxed{3}$

$\frac{2-10}{4}=\boxed{-2}$

14) Solve: $3x^2+5x=-21$

$+21 \quad +21$

$3x^2+5x+21=0$

$x=\frac{-5\pm\sqrt{5^2-4\cdot3\cdot21}}{2\cdot3}$ → Disc. $=-227$

$\boxed{\varnothing}$

$g = 32$ (ft) $\quad h = -\frac{1}{2}gt^2 + v_0 t + h_0$

$g = 9.8$ (m)

h_0 g v_0

15) A ball is thrown upward from a platform 8 meters off the ground at an initial velocity of 23 meters per second. Write an equation modeling the ball's height *h* over time *t*.

$h = -\frac{1}{2} \cdot 9.8t^2 + 23t + 8$

$\boxed{h = -4.9t^2 + 23t + 8}$

16) A ball is dropped from a platform 19 feet off the ground. Write an equation modeling the ball's height *h* over time *t*.

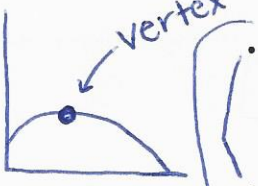
$v_0 = 0$

$h = -\frac{1}{2} \cdot 32t^2 + \cancel{0t} + 19$

$\boxed{h = -16t^2 + 19}$

17) A paper airplane is tossed from a desk 3 feet off the ground at an initial velocity of 5 feet per second. (Ignore wind resistance)

$h = -\frac{1}{2} \cdot 32t^2 + 5t + 3 \rightarrow h = -16t^2 + 5t + 3$



- What is the maximum height of the airplane?

$h = -b/2a \rightarrow -5/2 \cdot -16 = 0.15625$

(x) → time

$K = -16(0.15625)^2 + 5(0.15625) + 3$

(y) → height

$= 3.4$ ft

- How long before the plane reaches its maximum height?

$\boxed{0.15625 \text{ sec}}$

graph on calc.

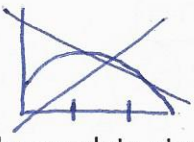
- How high is the plane after 1.5 seconds?

↳ plug in for t ↙ underground

$h = -16(1.5)^2 + 5(1.5) + 3 = \boxed{-25.5}$

- Approximately how long before the plane lands on the ground?

↳ graphing calc.



18) A baseball is hit at a height of 4.5 feet above home plate at an initial velocity of 72 feet per second.

$h = -\frac{1}{2} \cdot 32t^2 + 72t + 4.5 = h = -16t^2 + 72t + 4.5$

vertex

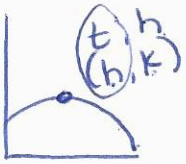
- What is the maximum height of the baseball?

$h = -16(2.25)^2 + 72(2.25) + 4.5$

t → (x) $\boxed{h = 85.5 \text{ ft}}$

- How long before the ball reaches its maximum height?

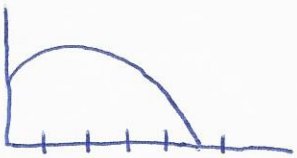
$h = -72/2 \cdot -16 = \boxed{2.25 \text{ sec}}$



- How high is the ball after 2.5 seconds? → t

$h = -16(2.5)^2 + 72(2.5) + 4.5 = \boxed{84.5 \text{ ft}}$

- Approximately how long before the ball reaches the ground?



(use graphing calc.)

2, 1, 0

19) Tell how many real roots the equation $y = 3x^2 - 30x + 75$ has. How do you know?

↳ Disc. $= b^2 - 4ac$ $(-30)^2 - 4 \cdot 3 \cdot 75 = 0$ $\sqrt{0} = 0$ (1 sol)

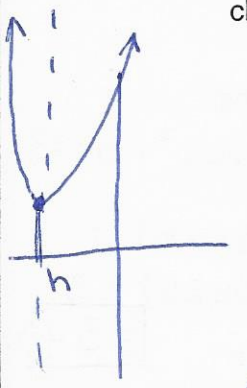
b/c Disc. = 0 ↳ one real root

20) Tell how many real roots the equation $y = -2x^2 + 5x - 11$ has. How do you know?

$5^2 - 4 \cdot -2 \cdot -11 = -63$ $\sqrt{-63} = \emptyset$

↳ no real roots, b/c disc. is −.

21) Consider the parabola defined by $y - 2 = 3(x+4)^2$. Identify each of the following characteristics: Vertex form



- Shape of Graph: parabola
- Vertex: $y - k = a(x-h)^2$ $y - 2 = 3(x+4)^2$ Vertex = (h, k) (−4, 2)
- Axis of Symmetry: $x = h$ $x = -4$

a
- Opens Up/Down: a is + → up
- Maximum or Minimum: minimum
- Wide, Skinny or Average: $a > 1$: skinny $(3 > 1)$

22) Consider the parabola defined by $y + 1 = -2(x-1)^2$ $y - k = a(x-h)^2$

- Shape of Graph: parabola
- Vertex: (1, −1)
- Axis of Symmetry: $x = 1$

$a = -2$
- Opens Up/Down: Down (a is −)
- Maximum or Minimum: maximum
- Wide, Skinny or Average: $2 > 1$: skinny

23) Consider the parabola defined by $y-2=-\frac{2}{3}(x+1)^2$

$y-k=a(x-h)^2$

- Shape of Graph: parabola
- Vertex: (h,k) → $(-1, 2)$
- Axis of Symmetry: $X=-1$

$a=-2/3$

- Opens Up/Down: Down (a is −)
- Maximum or Minimum: maximum
- Wide, Skinny or Average: $2/3 < 1$ wide

24) Consider the parabola defined by $y=\frac{1}{2}x^2-3x+5$

- Shape of Graph: parabola
- Vertex: $(3, 0.5)$

$h=-b/2a \rightarrow 3/2\cdot 1/2=3$ $\quad K=1/2(3)^2-3(3)+5=+0.5$

- Axis of Symmetry: $X=3$

$a=1/2$

- Opens Up/Down: Up
- Maximum or Minimum: minimum
- Wide, Skinny or Average: $1/2<1$ wide
- Number of Roots:

↳ Disc $=b^2-4ac$

$(-3)^2-4\cdot 1/2\cdot 5=-1$

↳ D is −

No Roots

25) Consider the parabola defined by $y = x^2 + 2x - 15$

- Shape of Graph: parabola
- Vertex: $h = -b/2a \rightarrow -2/2 \cdot 1 = -1$ $\quad K = (-1)^2 + 2(-1) - 15 = -16$ $\quad (-1, -16)$
- Axis of Symmetry: $x = -1$

$a = 1$

- Opens Up/Down: Up
- Maximum or Minimum: ∪ minimum
- Wide, Skinny or Average: $1 = 1$ Average

- Number of Roots: $D = 2^2 - 4 \cdot 1 \cdot -15 = 64$

↳ D is + 2 real roots