A

Right 2, up 7, stretched vertically by 3

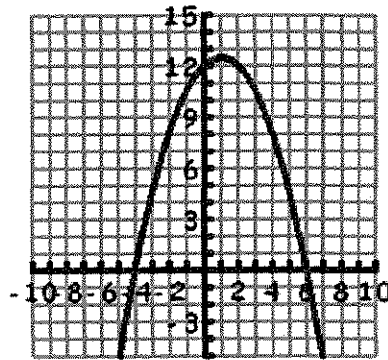**Factor Completely**
$20x^2 - 11x - 3$

$-15 \cdot 4 = -60$
$-15 + 4 = -11$

$$\underline{20x^2 - 15x} + \underline{4x - 3}$$
$$5x \quad 5x \qquad +1 \quad +1$$
$$5x(4x-3) + 1(4x-3)$$
$$(5x+1)(4x-3)$$

B

$$\frac{-3 \pm \sqrt{3}}{2}$$

Write equation of the quadratic shown in standard form. (Vertex is (1, 12.5)

① Get factored form from zeros $(-4,0), (6,0)$
$$y = a(x+4)(x-6)$$

② Find a by substituting a point like the vertex or y-intercept
$(1, 12.5)$ $(0, 12)$
↙ I used y-intercept

$12 = a(0+4)(0-6)$
$12 = a(4)(-6)$
$12 = a(-24)$
$a = -\frac{1}{2}$

③ Substitute "a" into factored form and distribute
$$y = -\frac{1}{2}(x+4)(x-6)$$

$$y = -\frac{1}{2}(x^2 - 6x + 4x - 24)$$
$$y = -\frac{1}{2}(x^2 - 2x - 24)$$
$$\boxed{y = -\frac{1}{2}x^2 + x + 12}$$

1

C 2 real rational

Describe how the graph of
$y = 3(x-2)^2 + 7$ is changed
from the parent graph
$y = x^2$.

right 2 (inside by x →do opposite
of what expect to work your
way outside the function
up 7 (from +7 on back),
stretched vertically by 3

D $\dfrac{3 \pm \sqrt{33}}{6}$

Graph $y = x^2 - 6x - 7$.

Tell the vertex,
x-intercepts,
y-intercept,
and axis of symmetry.

$y = (x-7)(x+1)$
$x - 7 = 0 \quad x + 1 = 0$
$\quad x = 7 \quad\quad x = -1$

zeros
x-intercepts $(7, 0)$
roots $(-1, 0)$

vertex $\quad$ average x-intercepts $\dfrac{7+1}{2} = \dfrac{6}{2} = 3$

$(3, -16) \quad y = 3^2 - 6(3) - 7$
$\quad\quad\quad 9 - 18 - 7$
$\quad\quad\quad 9 - 25$

y-int $\quad y = 0^2 - 6(0) - 7$
$(0, -7)$

2

AoS
$x = 3$
↑x from vertex

E

$y = -1.5x^2 - 3x + 12$

Two toy rockets are shot upward from ground level.

Rocket A

Time (seconds)	0	1	2	3	4	9	13
Height (feet)	0	256	480	672	832	1152	832

$y = -16x^2 + 272x$

$(0,0) \quad (17,0)$

Rocket B

$Y = -16x^2 + 250x$

$(0,0)(15.63,0)$

For how many seconds is the rocket that travels the farthest in the air?

17 seconds

F

$32.5 \quad , 75$

Solve by factoring
$$6x^2 = 5x - 1$$

$$6x^2 - 5x + 1 = 0$$

$$\frac{6x^2 - 3x - 2x + 1}{3x \quad 3x \quad -1 \quad -1} = 0$$

$$3x(2x - 1) - 1(2x - 1) = 0$$

$$(3x - 1)(2x - 1) = 0$$

$-3 \cdot -2 = 6$

$-3 + -2 = -5$

$3x - 1 = 0 \qquad 2x - 1 = 0$

$3x = 1 \qquad 2x = 1$

$x = \frac{1}{3} \qquad x = \frac{1}{2}$

3

G

2 imaginary

Using the formula
$h(t) = 160t - 16t^2$ where $h(t)$ is
the height of the ball in feet
and t is the time in seconds.

After how many seconds
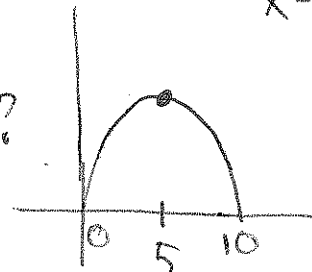is the ball at its maximum?

5
seconds

$160t - 16t^2$
$16t(10-t)$
$t = 0, 10$ zeros

$x = \frac{0+10}{2} = 5$

= x-value
of
vertex

vertex is at
$x = 5$ seconds

Fix

H .... -3.25

Describe the type and
number of solutions of
$3x^2 + 4x = -5$.

$3x^2 + 4x + 5 = 0$

$b^2 - 4ac$ discriminant
$4^2 - 4(3)(5)$

$16 - 60$

-44

2 imaginary

4

I $\quad$ _ $, \sqrt{15}, -\sqrt{15}$

Describe the type and number of solutions of $3x^2 + 2 = 5x$.

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

$b^2 - 4ac = (-5)^2 - 4(3)(2)$

$= 25 - 24$

$= 1$

$\boxed{2 \text{ real rational}}$

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

$$\frac{5 \pm \sqrt{1}}{2(3)} \qquad \frac{5 \pm 1}{6}$$

J $\quad$. 1156

Find the exact values of the solutions.

$3x^2 = 3x + 2$

$3x^2 - 3x - 2 = 0$

$$\frac{3 \pm \sqrt{(-3)^2 - 4(3)(-2)}}{2(3)}$$

$$= \frac{3 \pm \sqrt{9 + 24}}{6} = \boxed{\frac{3 \pm \sqrt{33}}{6}}$$

K

left 2, down 7

Solve
$$-2x^2 + 3x = 1$$

$$-2x^2 + 3x - 1 = 0$$

$$\frac{-3 \pm \sqrt{(3)^2 - 4(-2)(-1)}}{2(-2)}$$

compressed vertically by 1/3

$$\frac{-3 \pm \sqrt{9-8}}{-4} = \frac{-3 \pm \sqrt{1}}{-4}$$

$$= \frac{-3 \pm 1}{-4} = \frac{-3+1}{-4}, \frac{-3-1}{-4}$$

$$= \frac{-2}{-4}, \frac{-4}{-4}$$

$$= \boxed{\frac{1}{2}, 1}$$

L

$$4(x+7)(x-4)$$

Two toy rockets are shot upward from ground level.

Rocket A

Time (seconds)	0	1	2	3	4	9	13
Height (feet)	0	256	480	672	832	1152	832

Rocket B
$$Y = -16x^2 + 250x$$

many feet
How high up does the highest rocket travel?

$\sqrt{}(8.5, 1156)$

Vertex (7.8125, 976.56)

✓
Fix

$$\boxed{1156}$$

2

M   . , 17

Factor completely
$4x^2 + 12x - 112$

$4(x^2 + 3x - 28$

$4(x+7)(x-4)$

N $1/2$, 1

Give the exact answer(s)
for the solutions of
$2x^2 = -6x - 3$

$2x^2 + 6x + 3 = 0$

$\dfrac{-6 \pm \sqrt{(6)^2 - 4(2)(3)}}{2(2)} =$

$\dfrac{-6 \pm \sqrt{36 - 24}}{4} = \dfrac{-6 \pm \sqrt{12}}{4}$

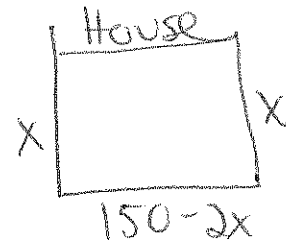$\dfrac{-6 \pm \sqrt{4}\sqrt{3}}{4} = \dfrac{-6 \pm 2\sqrt{3}}{4}$

$\boxed{\dfrac{-3 \pm \sqrt{3}}{2}}$

3

O $(5x+1)(4x-3)$

John is planting a garden against one side of his house. He has 150 feet of fencing to use to keep animals out of the garden.

Find the dimensions that would maximize the area of the garden.

House

x | x

$150-2x$

Area $= x(150-2x)$

Area $= 150x - 2x^2$

$V(37.5, 2812.5)$

$37.5, 75$

P $\frac{1}{3}, \frac{1}{2}$

Describe how the graph of $y = 1/3(x+2)^2 - 7$ is changed from the parent graph $y = x^2$.

left 2,

down 7,

compressed vertically by $\frac{1}{3}$

4

Q

vertex $(3, -16)$; x-intercepts $(7, 0)$, $(-1, 0)$

y-intercept $(0, -7)$; A.o.S. $x = 3$

Solve $5x^2 - 75 = 0$.

$$\frac{5x^2}{5} = \frac{75}{5}$$

$$x^2 = 15$$

$$\boxed{x = \pm\sqrt{15}}$$

R

vertex $(1, 12)$; x-intercepts $(3, 0)$, $(-1, 0)$;

y-intercept $(0, 9)$; A.o.S. $x = 1$

A skating rink manager finds the revenue y based on an hourly fee x for skating is represented by the function
$y = -480x^2 + 3120x$.
What hourly fee will produce maximum revenues?

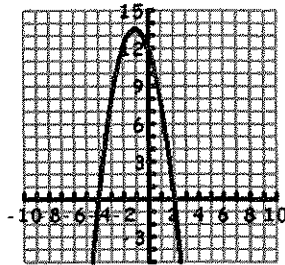$$\boxed{3.25}$$

vertex $(3.25, 5070)$
done in calc.

S 5

Write equation of the quadratic shown in standard form. (Vertex is (-1, 13.5))

① Write factored form using zeros $(-4,0), (2,0)$

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

② Substitute another point like vertex or y-intercept for x,y to find a

$$13.5 = a(-1+4)(-1-2)$$
$$13.5 = a(3)(-3)$$
$$\frac{13.5}{-9} = \frac{a(-9)}{-9}$$
$$-1.5 = a$$

③ Substitute a into factored form
$$y = -1.5(x+4)(x-2)$$

④ Distribute to get standard form
$$y = -1.5(x+4)(x-2)$$
$$y = -1.5(x^2+2x-8)$$
$$\boxed{y = -1.5x^2 - 3x + 12}$$

☑ Fix
9
not
-9

T

$$y = -\frac{1}{2}x^2 + x + 12$$

Graph $y = -3x^2 + 6x + 9$.

Tell the vertex,
x-intercepts,
y-intercept,
and axis of symmetry.

$$\frac{-3 \cdot 1 = -3}{-3 + 1 = -2}$$

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

x-intercepts   (3, 0)
zeros
roots   (-1, 0)
solutions

vertex $x = \frac{3+1}{2} = \frac{2}{2} = 1$

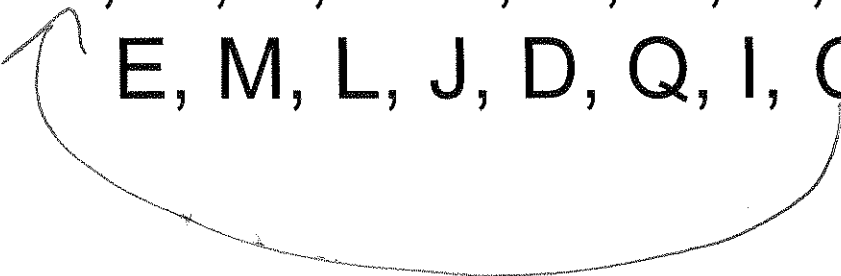$$y = -3(1)^2 + 6(1) + 9$$
$$y = -3 + 6 + 9 \quad (1, 12)$$
$$y = 12$$

y-intercept
$$y = -3(0)^2 + 6(0) + 9$$
$$(0, 9)$$

Axis of symmetry
$$x = 1$$
↗
x from vertex

6

A, O, F, P K, N, B, T, R, H, G, S,
E, M, L, J, D, Q, I, C

Order of questions
makes a full circle !!