

1) If a rock is dropped off of a bridge that is 30 feet above a river, how long will it take the rock to hit the water?

$$h = -16t^2 + 30$$

$$\sqrt{t^2} = \sqrt{\frac{30}{16}}$$

$$0 = -16t^2 + 30$$

$$-30 = -16t^2$$

$$t = 1.4 \text{ sec}$$

2) A tennis player hits a ball 1 meter above the ground with a velocity of 20 m/sec. When will the ball be at a height of 1 meter again?

$$h = -16t^2 + 20t + 1$$

$$0 = -46(4t - 5)$$

$$1 = -16t^2 + 20t + 1$$

$$t = \frac{5}{4} \text{ or } 1.25 \text{ sec}$$

$$0 = -16t^2 + 20t$$

3) A tennis player hits a ball 1 meter above the ground with a velocity of 20 m/sec. What is the maximum height the ball will reach?

$$h = -16t^2 + 20t + 1$$

$$\frac{-20}{-32}$$

$$.625, 7.25$$

$$7.25 \text{ meters}$$

4) A tennis player hits a ball 1 meter above the ground with a velocity of 20 m/sec. How long will it take the ball to hit the ground?

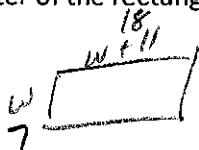
$$h = -16t^2 + 20t + 1$$

$$\frac{-20 \pm \sqrt{(20)^2 - 4(-16)(1)}}{-32}$$

$$\frac{-20 - 21.5}{-32}$$

$$1.3 \text{ sec}$$

5) The area of a rectangle is 126 units squared. The length is 11 more than the width. What is the perimeter of the rectangle?



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$$w(w+11) = 126$$

$$w^2 + 11w - 126 = 0$$

$$(w-7)(w+18) = 0$$

$$w = 7, -18$$

$$\frac{-126}{6 \sqrt{21} = 11}$$

$$-7/18$$

Find the value of 'c' that makes the trinomial a perfect square trinomial

6) $x^2 - 20x + c$

$$\left(\frac{-20}{2}\right)^2 = (-10)^2 = 100$$

7) $x^2 - 5x + c$

$$\left(\frac{-5}{2}\right)^2 = \frac{25}{4}$$

Solve by Completing the Square

$$8) x^2 - 4x - 14 = -2$$

$$\begin{array}{ccc} & +4 & +4 \\ x^2 - 4x + 4 & = & 12 + 4 \end{array}$$

$$\sqrt{(x-2)^2} = \sqrt{16}$$

$$x-2=4 \quad x-2=-4$$

$$x=6 \quad x=-2$$

$$9) 3x^2 + 6x - 26 = -2$$

$$\begin{array}{ccc} & +4 & +20 \\ \frac{3x^2}{3} + \frac{6x}{3} & = & \frac{24}{3} \end{array}$$

$$x^2 + 2x + 1 = 8 + 1$$

$$\sqrt{(x+1)^2} = \sqrt{9}$$

$$x+1=3 \quad x+1=-3$$

$$x=2 \quad x=-4$$

Solve by Quadratic Formula

$$10) 3x^2 = 36 + 3x$$

$$3x^2 - 3x - 36 = 0$$

$$\frac{3 \pm \sqrt{9 - 4(3)(-36)}}{6} = \frac{3 \pm \sqrt{441}}{6} = \frac{3 \pm 21}{6}$$

$$\frac{3+21}{6} = \frac{24}{6} = 4$$

$$\frac{3-21}{6} = \frac{-18}{6} = -3$$

Find the vertex and axis of symmetry

$$x = -3, 4$$

$$11) f(x) = -x^2 - 2x - 5$$

$$\text{Vertex: } (-1, -4)$$

$$\text{Axis of Symmetry: } x = -1$$

$$\frac{-2}{2(-1)} = -1$$

$$12) f(x) = 2x^2 - 12x + 15$$

$$\text{Vertex: } (3, -3)$$

$$\text{Axis of Symmetry: } x = 3$$

$$\frac{12}{4} = 3$$

$$13) f(x) = (x+2)^2 + 4$$

$$\text{Vertex: } (-2, 4)$$

$$\text{Axis of Symmetry: } x = -2$$

Convert from general/standard form to vertex form

$$14) f(x) = -x^2 + 6x - 8$$

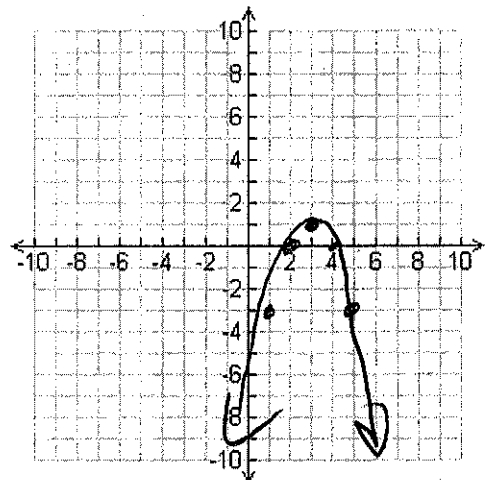
$$= -(x^2 - 6x + 9 - 9) - 8$$

$$= -(x^2 - 6x + 9) - 8 + 9$$

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

$$(3, 1)$$

x	y
5	-3
4	0
3	1
2	0
1	-3



15) Graph the equation from question 14.

You must show how you arrived at the points.

16) What are the roots to question 14?

$$x = 4, 2$$

17) Given your answer to question 16, describe the value of the discriminant without calculating it?

$$> 0$$

18) Is the graph narrower or wider or the same width as the parent function? Explain.

$$\text{Same } |a| = 1$$

19) Describe the roots if the equation is $f(x) = -2x^2 - 8x - 6$.

$$b^2 - 4ac$$

$$64 - 4(-2)(-6) = 16 > 0$$

2 real roots

20) Describe the graph from equation 19.

Vertex: $(-2, 2)$

Axis of Symmetry: $x = -2$

Max/Min: $\text{max @ } 2$

Open direction: down

$$\begin{aligned} & -2(x^2 + 4x + 4 - 4) - 6 + 8 \\ & -2(x^2 + 4x + 4) - 6 + 8 \\ & -2(x+2)^2 + 2 \end{aligned}$$