MAT 055
Practice Test Chp 18
Version A

Name___Answers___

Date_____

Campus_____

All answers are to be in simplest form. A scientific calculator may be used. No notes, no books, no homework may be used. This is a practice test consisting of basic concepts presented. It reflects what could be on the actual test. <u>Students are encouraged to review all of the material presented</u>.

$x = \dfrac{-b}{2a}$ Find y by substituting the x value back in. Note that f(x) is replaced by y.

Find the vertex of the parabola.

$$x = \dfrac{-\left(\dfrac{-2}{3}\right)}{2\left(\dfrac{1}{3}\right)} = +\dfrac{2}{3} \div \dfrac{2}{3} = ^{1}\dfrac{2}{3} \cdot \dfrac{3}{2} = 1$$

1) $f(x) = \dfrac{1}{3}x^2 - \dfrac{2}{3}x - \dfrac{11}{3}$ Vertex:(1 , -4)

Answer: (1, –4)

$$y = \dfrac{1}{3}(1)^2 - \dfrac{2}{3}(1) - \dfrac{11}{3} = \dfrac{1}{3} - \dfrac{2}{3} - \dfrac{11}{3} = \dfrac{-12}{3}$$

$$y = -4$$

2) $f(x) = 3x^2 - 2$ $f(x) = 3x^2 + 0x - 2$ Vertex:(0 , -2)

Answer: (0, –2)

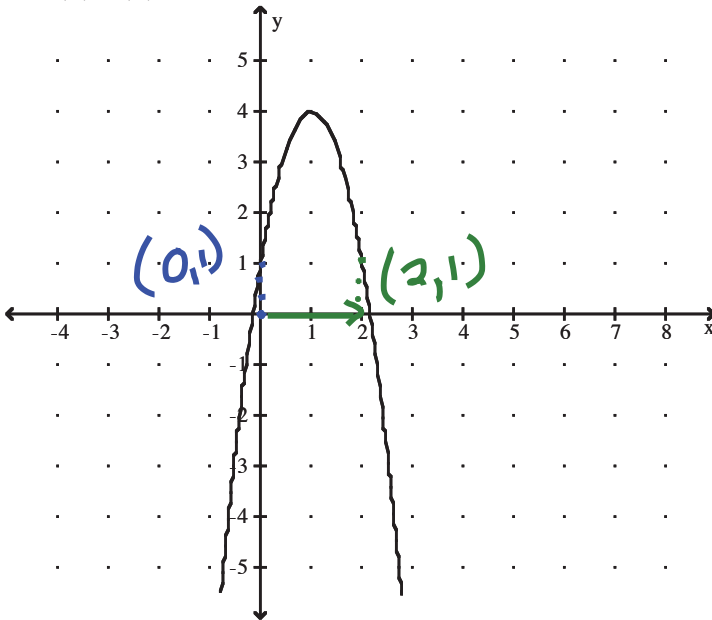$$x = \dfrac{0}{2(3)} = \dfrac{0}{6} = 0$$

Substitute a zero term for missing b or c terms. The a term cannot be missing or it is no longer a quadratic.

$$y = 3(0)^2 + 0(0) - 2$$

$$y = -2$$

Use the graph of f to evaluate each expression.

3)   f(0), f(2)

Given the x value, what is the y value?

$(0,1)$ $(2,1)$

f(0) = ___|___ f(2) = ___|___

Answer: 1, 1

For the given f(x), find the following and graph the function.

$f(x) = 3x^2 + 0x + 0$ $y = 3(0)^2 + 0(0) + 0$

4) $f(x) = 3x^2$ $x = \dfrac{0}{2(3)} = \dfrac{0}{6} = 0$ $y = 0$

a)   Identify the vertex _____$(0,0)$_____

Express as an equation. Use the x value from the vertex.

b)   What is the axis of symmetry? $x = 0$

Opens up when the a term is positive.

c)   Does the graph open up or down? $\cup$ up

Vertex is the lowest point.

d)   Will the vertex results in a minimum or maximum value? _minimum_

e)   Indentify the minimum or maximum y–value. _____0_____   y value of the vertex

f)   Evaluate f(–2) ____12____ $f(-2) = 3(-2)^2 \Rightarrow f(-2) = 3(4)$

$f(-2) = 12$
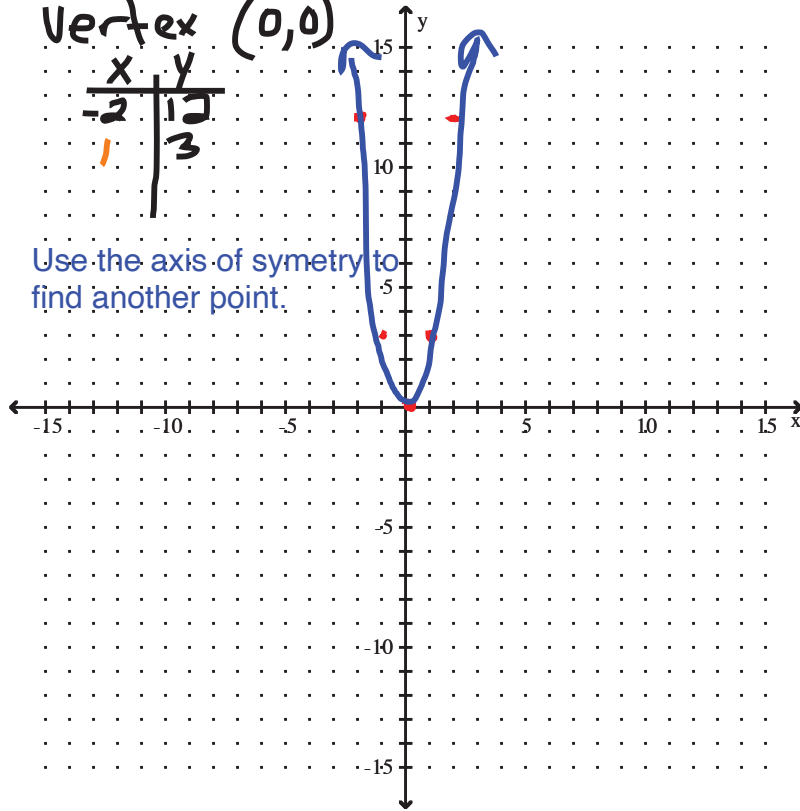
g)   Evaluate f(3) ____27____ $f(3) = 3(3)^2 \Rightarrow f(3) = 3(9) \Rightarrow f(3) = 27$
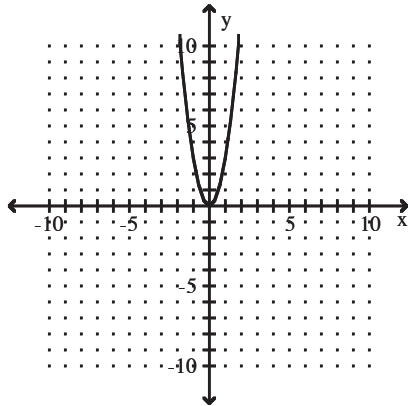
h)   Graph the function.

$f(x) = 3x^2$

Vertex $(0,0)$

X	Y
-2	12
1	3

Use the axis of symetry to find another point.

Answer:

For the given equation, find the following then graph and solve the equation.
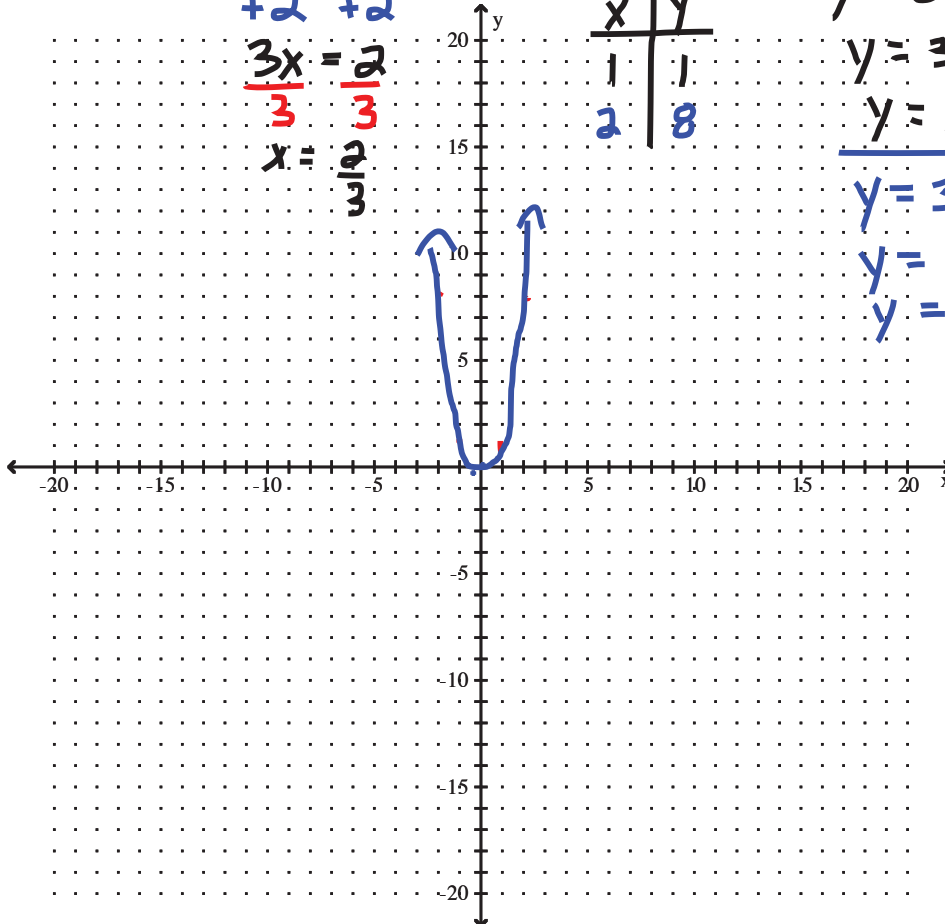
Solve quadratic equation by factoring.

6) $x^2 + 5x - 14 = 0$

$(x+7)(x-2) = 0$

$x = -7 \quad x = 2$

Answer: –7, 2

Use the square root property to solve the equation.

Because you are taking the square root on each side, make sure to use plus/minus.

7) $\sqrt{(x+6)^2} = \pm\sqrt{13}$

$x + 6 = \pm\sqrt{13}$
$ -6 \qquad -6$
$x = -6 \pm \sqrt{13}$

Answer: $-6 \pm \sqrt{13}$

8) $\sqrt{(7x+4)^2} = \pm\sqrt{15}$

Answer: $\dfrac{-4 \pm \sqrt{15}}{7}$

$7x + 4 = \pm\sqrt{15}$
$ -4 \qquad -4$
$7x = -4 \pm \sqrt{15}$
$\overline{7} \qquad \overline{7}$
$x = \dfrac{-4 \pm \sqrt{15}}{7}$

Find the term that should be added to the expression to form a perfect square trinomial. Write the resulting perfect square trinomial in factored form.

$\left(\dfrac{b}{2}\right)^2$ add to both sides

9) $x^2 + 7x$

Answer: $\dfrac{49}{4}; \left(x + \dfrac{7}{2}\right)^2$

$\left(\dfrac{b}{2}\right)^2$

$x^2 + 7x + \underline{\left(\dfrac{7}{2}\right)^2}$

$x^2 + 7x + \dfrac{49}{4} = \left(x + \dfrac{7}{2}\right)^2$

$\left(\dfrac{7}{2}\right)^2 = \dfrac{49}{4}$

Term to add __$\left(\dfrac{7}{2}\right)^2$__

Factored Form __$\left(x + \dfrac{7}{2}\right)^2$__

Solve the equation by completing the square.

10) $x^2 - 2x - 15 = 0$ $+15 \ +15$

Answer: 5, –3

While this could be factored other ways, the question asks for completing the square.

$x^2 - 2x + \underline{\left(\dfrac{2}{2}\right)^2} = 15 + \underline{\left(\dfrac{-2}{2}\right)^2}$

$x^2 - 2x + 1 = 15 + 1$

$\sqrt{(x-1)^2} = \sqrt{16}$

$(x - 1) = \pm 4$

$+1 \qquad +1$

$x = 1 \pm 4$

$x = 1 + 4 \qquad x = 1 - 4$

$x = 5 \qquad x = -3$

11) $\dfrac{4x^2}{4} + \dfrac{6x}{4} = \dfrac{-1}{4}$

Answer: $\dfrac{-3 \pm \sqrt{5}}{4}$

$\left(\dfrac{b}{2}\right)^2$ Not $\dfrac{-b}{2a}$

$\left(\dfrac{\frac{3}{2}}{2}\right)^2 = \left(\dfrac{3}{2} \div \dfrac{2}{1}\right)^2$

$\left(\dfrac{3}{2} \cdot \dfrac{1}{2}\right)^2$

$\left(\dfrac{3}{4}\right)^2$

$\dfrac{9}{16}$

$x^2 + \dfrac{3}{2}x + \dfrac{9}{16} = -\dfrac{1}{4} + \dfrac{9}{16}$

$\sqrt{\left(x + \dfrac{3}{4}\right)^2} = \pm\sqrt{\dfrac{5}{16}}$

$x + \dfrac{3}{4} = \pm\dfrac{\sqrt{5}}{\sqrt{16}}$

$x + \dfrac{3}{4} = \pm\dfrac{\sqrt{5}}{4}$

$-\dfrac{3}{4} \qquad -\dfrac{3}{4}$

$x = -\dfrac{3}{4} \pm \dfrac{\sqrt{5}}{4}$

or

$x = \dfrac{-3 \pm \sqrt{5}}{4}$

Divide by the a coefficient to create a leading coefficient of 1.

$-\dfrac{4}{16} + \dfrac{9}{16} = \dfrac{5}{16}$

Rationalize the denominator

12) $\dfrac{7x^2}{7} + \dfrac{2x}{7} - \dfrac{5}{7} = \dfrac{0}{7}$

While this could be factored other ways, the question asks for completing the square.

$\left(\dfrac{2}{7} \cdot \dfrac{1}{2}\right)^2$

$\left(\dfrac{2}{14}\right)^2 = \dfrac{4}{196}$

$x^2 + \dfrac{2}{7}x - \dfrac{5}{7} = 0$

$+\dfrac{5}{7} \qquad +\dfrac{5}{7}$

$x^2 + \dfrac{2}{7}x + \dfrac{4/196}{2} = \dfrac{5 \cdot 28}{7 \cdot 28} + \dfrac{4}{196}$

$\left(x + \dfrac{2}{14}\right)^2 = \dfrac{140}{196} + \dfrac{4}{196}$

$\sqrt{\left(x + \dfrac{2}{14}\right)^2} = \pm\sqrt{\dfrac{144}{196}}$

$x + \dfrac{2}{14} = \pm\dfrac{12}{14}$

$-\dfrac{2}{14} \qquad -\dfrac{2}{14}$

Answer: $\dfrac{5}{7}$, -1

$x = -\dfrac{2}{14} + \dfrac{12}{14}$

$x = \dfrac{10}{14} = \dfrac{5}{7}$

$x = -\dfrac{2}{14} - \dfrac{12}{14}$

$x = -\dfrac{14}{14} = -1$

13) $x^2 + x + 8 = 0$

$ -8 \quad -8$

$x^2 + x + \left(\dfrac{1}{2}\right)^2 = -8 + \left(\dfrac{1}{2}\right)^2$

$x^2 + x + \dfrac{1}{4} = -8 + \dfrac{1}{4}$

$\sqrt{\left(x + \dfrac{1}{2}\right)^2} = \pm\sqrt{\dfrac{-31}{4}}$

$x + \dfrac{1}{2} = \dfrac{\sqrt{-31}}{\sqrt{4}}$

Answer: $\dfrac{-1 \pm i\sqrt{31}}{2}$

$= -\dfrac{1}{2} \pm i\dfrac{\sqrt{31}}{2}$

$x + \dfrac{1}{2} = \dfrac{i\sqrt{31}}{2}$

$-\dfrac{1}{2} \qquad -\dfrac{1}{2}$

$x = -\dfrac{1}{2} \pm i\dfrac{\sqrt{31}}{2}$

$-\dfrac{8 \cdot 4}{1 \cdot 4} + \dfrac{1}{4}$

$-\dfrac{32}{4} + \dfrac{1}{4}$

$-\dfrac{31}{4}$

Solve the formula for the specified variable.

14) $Ve = \dfrac{1}{2}mv^2$ for v (little v)

$2. \quad 2.$

$\dfrac{2Ve}{m} = \dfrac{mv^2}{m}$

$\pm\sqrt{\dfrac{2Ve}{m}} = \sqrt{v^2}$

$\pm\sqrt{\dfrac{2Ve}{m}} = v$

Answer: $v = \pm\sqrt{\dfrac{2Ve}{m}}$

Use the discriminant to determine the number of real solutions.

15) $x^2 - 6x + 3 = 0$

Answer: Two real solutions

$a = 1 \quad b = -6 \quad c = 3$

LOOK @ $b^2 - 4ac$

$(-6)^2 - 4(1)(3)$

$36 - 12$

24

2 real solutions

$b^2 - 4ac > 0 \quad$ 2 real

$b^2 - 4ac = 0 \quad$ 1 real

$b^2 - 4ac < 0 \quad$ 2 Not real

16) $x^2 + 4x + 6 = 0$

$4^2 - 4(1)(6)$

$16 - 24$

Answer: No real solutions

$a = 1 \quad b = 4 \quad c = 6$

$- 8$

No Real solutions

$0 - zero$

Solve the equation using the quadratic formula. Write complex solutions in standard form.

17) $x^2 + x + 9 = 0$

$\dfrac{-1 \pm \sqrt{1^2 - 4(1)(9)}}{2(1)}$

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

$a = 1 \quad b = 1 \quad c = 9$

$\dfrac{-1 \pm \sqrt{1 - 36}}{2(1)}$

$\dfrac{-1 \pm \sqrt{-35}}{2} = \dfrac{-1 \pm i\sqrt{35}}{2} = -\dfrac{1}{2} \pm i\dfrac{\sqrt{35}}{2}$

Correct form for a+bi

Answer: $-\dfrac{1}{2} \pm i\dfrac{\sqrt{35}}{2}$

18) $9x^2 + 5x + 2 = 0$

$\dfrac{-5 \pm \sqrt{5^2 - 4(9)(2)}}{2(9)}$

$a = 9 \quad b = 5 \quad c = 2$

$\dfrac{-5 \pm \sqrt{25 - 72}}{18}$

$\dfrac{-5 \pm \sqrt{-47}}{18} = \dfrac{-5 \pm i\sqrt{47}}{18} = -\dfrac{5}{18} \pm i\dfrac{\sqrt{47}}{18}$

Correct form for a+bi

Answer: $-\dfrac{5}{18} \pm i\dfrac{\sqrt{47}}{18}$

Use the given substitution to solve the equation.

19) $x^4 - 9x^2 + 8 = 0$, $\underline{u = x^2}$

$(x^2)^2 = x^4$

$u^2 - 9u + 8 = 0$

$(u - 1)(u - 8) = 0$

$u = 1 \quad u = 8$

$\sqrt{x^2} = 1 \quad \sqrt{x^2} = 8$

$x = \pm 1 \quad x = \pm\sqrt{8}$

$x = \pm 2\sqrt{2}$

$\sqrt{8}$

$\sqrt{4} \quad \sqrt{2}$

$2 \sqrt{2}$

Answer: $\pm 1, \pm 2\sqrt{2}$

Solve the equation.

$u = \sqrt{x}$

20) $x - 13\sqrt{x} + 42 = 0$

Answer: 36, 49

The b term provides a hint on how to set up the substitution.

$u^2 - 13u + 42 = 0$

$\sqrt{x^2} = x$

$(u - 6)(u - 7) = 0$

$u = 6 \quad u = 7$

$(\sqrt{x})^2 = (6)^2 \quad (\sqrt{x})^2 = (7)^2$

$x = 36 \quad x = 49$