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. Students are encouraged to review all of the material presented.

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

Find the vertex of the parabola.

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

Answer: (1, –4)

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

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

$y = -4$

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

Answer: (0, –2)

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

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

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

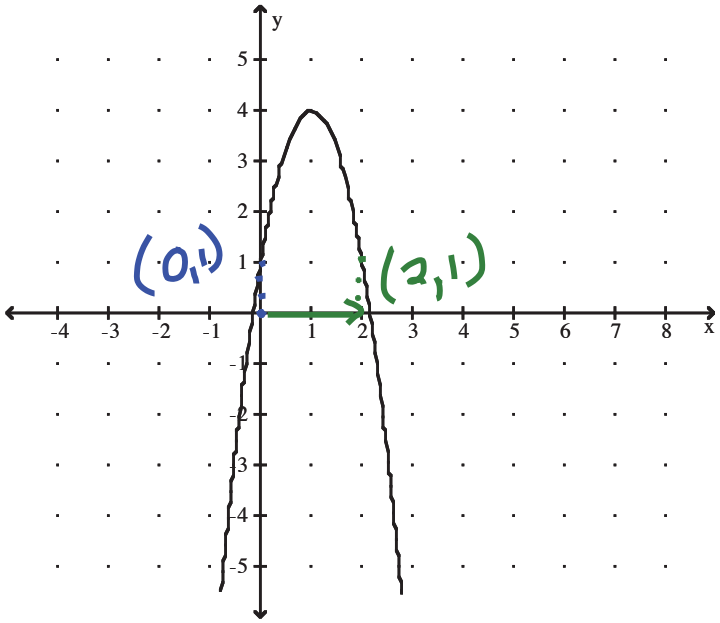
$y = -2$

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

Use the graph of f to evaluate each expression.

3) f(0), f(2)

Given the x value, what is the y value?



f(0) = 1 f(2) = 1

Answer: 1, 1

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

4) $f(x) = 3x^2$

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

$x = \frac{0}{2(3)} = \frac{0}{6} = 0$ $\quad y = 0$

a) Identify the vertex (0, 0)

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

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

Opens up when the a term is positive.

c) Does the graph open up or down? ∪ 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 $\quad f(-2) = 3(-2)^2 \Rightarrow f(-2) = 3(4)$

$f(-2) = 12$

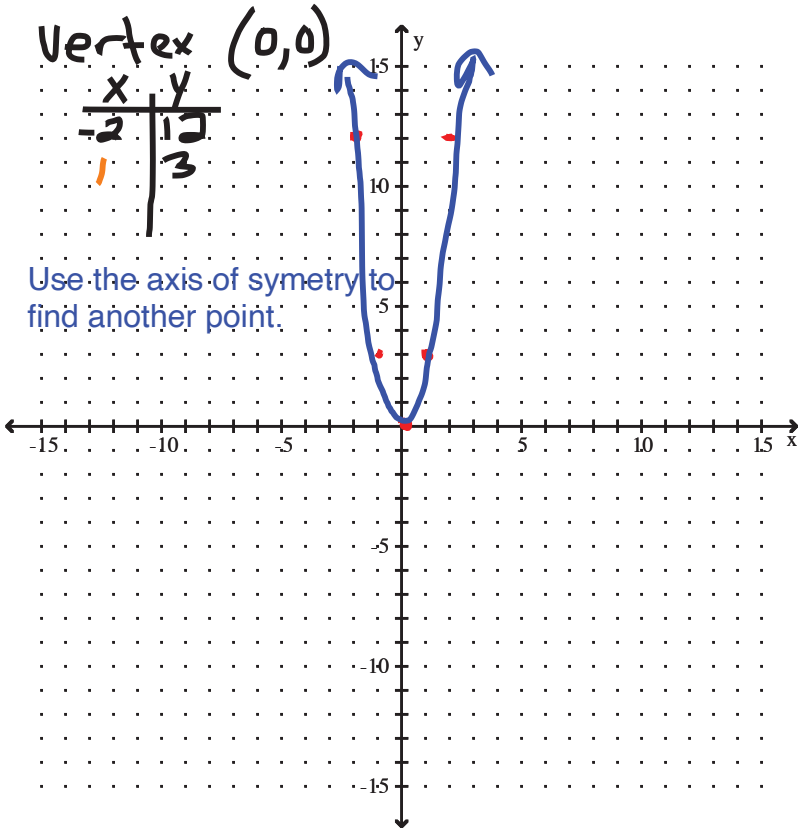
g) Evaluate f(3) 27 $\quad f(3) = 3(3)^2 \Rightarrow f(3) = 3(9) \Rightarrow f(3) = 27$

h) Graph the function.

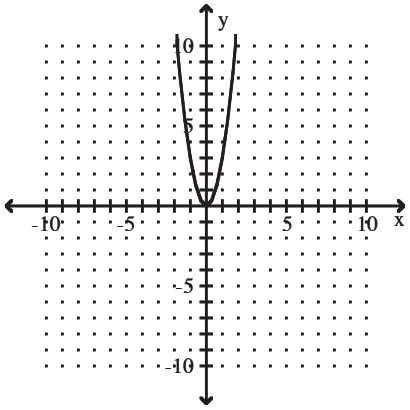
$f(x) = 3x^2$

Vertex (0,0)

x	y
-2	12
-1	3



Answer:



For the given equation, find the following then graph and solve the equation.

5) $f(x) = 3x^2 - 2x$

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

$x = \frac{-(-2)}{2(3)} = \frac{2}{6} = \frac{1}{3}$

$3\left(\frac{1}{3}\right)^2 - 2\left(\frac{1}{3}\right) = y$

$3\left(\frac{1}{9}\right) - \frac{2}{3} = y$

$\frac{1}{3} - \frac{2}{3} = y$

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

Answer: [redacted]

a) Identify the vertex $\left(\frac{1}{3}, -\frac{1}{3}\right)$

b) What is the axis of symmetry? $x = \frac{1}{3}$

a term is positive so opens up

c) Does the graph open up or down? U up

f) Graph the equation.

g) What is(are) the solution(s) to the equation? $x = 0, \frac{2}{3}$

If the solution is not real, say so.

$3x^2 - 2x = 0$

$x(3x - 2) = 0$

Factor, use the quadratic equation or complete the square to solve.

$x = 0 \quad 3x - 2 = 0$

$+2 \quad +2$

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

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

Set each factor the contains a variable to zero and solve.

$y = 3x^2 - 2x$

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

$y = 3 - 2$

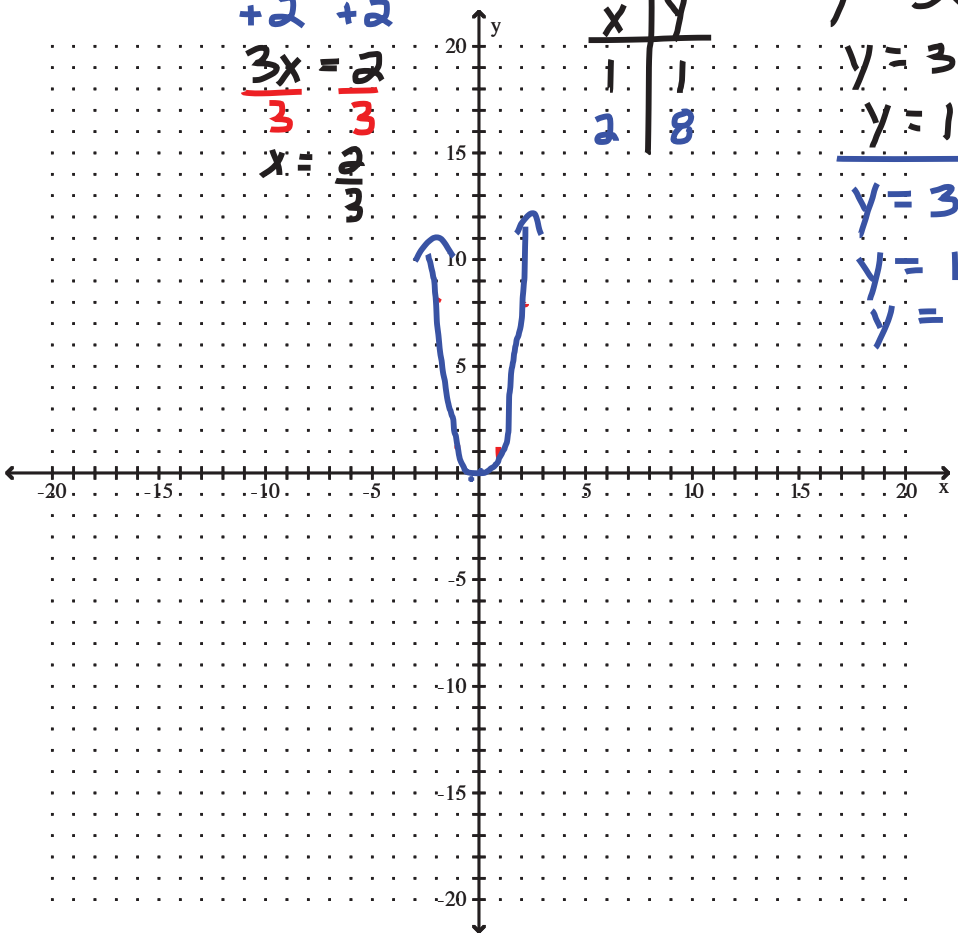
$y = 1$

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

$y = 12 - 4$

$y = 8$

x	y
1	1
2	8



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.

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

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

$-6 \quad -6$

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

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

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

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

$7x + 4 = \pm\sqrt{15}$

$-4 \quad -4$

$\frac{7x}{7} = \frac{-4 \pm \sqrt{15}}{7}$

$x = \frac{-4 \pm \sqrt{15}}{7}$

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

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.

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

9) $x^2 + 7x$

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

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

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

Term to add $\left(\frac{7}{2}\right)^2 = \frac{49}{4}$

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

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

Solve the equation by completing the square.

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

Answer: 5, -3

$+15 \quad +15$

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

$\left(\frac{b}{2}\right)^2 \quad \left(\frac{b}{2}\right)^2$

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

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

$(x - 1) = \pm 4$

$+1 \quad +1$

$x = 1 \pm 4$

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

$x = 5 \quad x = -3$

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

11) $4x^2 + 6x = -1$

$\frac{4}{4} \quad \frac{6}{4} \quad \frac{-1}{4}$

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

$x^2 + \frac{3}{2}x + \frac{9}{16} = -\frac{1}{4} + \frac{9}{16}$ $\quad .4 \quad .4$

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

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

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

$-\frac{3}{4} \quad -\frac{3}{4}$

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

or

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

$\frac{-b}{2a}$

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

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

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

$\frac{9}{16}$

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

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

Rationalize the denominator

12) $7x^2 + 2x - 5 = 0$

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

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

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

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

$+5/7 \quad +5/7$

$x^2 + \frac{2}{7}x + \frac{4}{196} = \frac{5}{7} + \frac{4}{196}$ (·28 · 28)

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

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

$x + \frac{2}{14} = \pm\frac{12}{14}$ $\quad -\frac{2}{14} \quad -\frac{2}{14}$

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

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

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

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

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

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

$-8 \quad -8$

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

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

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

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

$x + \frac{1}{2} = \frac{i\sqrt{31}}{2}$ $\quad -\frac{1}{2} \quad -\frac{1}{2}$

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

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

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

$-\frac{31}{4}$

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

Solve the formula for the specified variable.

$2\cdot \quad 2\cdot$

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

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

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

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

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

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

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

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

$b^2 - 4ac < 0$ 2 not real

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

Answer: No real solutions

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

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

$16 - 24$

-8 No Real solutions

0 - zero

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

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

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

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

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

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

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

Correct form for a+bi

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

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

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

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

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

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

Correct form for a+bi

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

Use the given substitution to solve the equation.

19) $x^4 - 9x^2 + 8 = 0$, $u = x^2$

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

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

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

$u = 1 \quad u = 8$

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

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

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

$\sqrt{8}$

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

$2\sqrt{2}$

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

Solve the equation.

$u = \sqrt{x}$

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

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

Answer: 36, 49

$\sqrt{x^2} = x$

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

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

$u = 6 \quad u = 7$

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

$x = 36 \quad x = 49$